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ABSTRACT

This report attempts to define and conceptualize the essential logic of the decision-making process which planners follow. The report proposes a look at decision-making theory to see if there exists some conceptualization of decision making which can be varied to fit the context in which decisions must be made. To provide for situational adjustments, a behavioral character must be graphed into a normative framework to provide for some measure of deviation from the norm that is being sought. In building this conceptual framework, two criteria were followed: (1) Throughout the model, logic and consistency must prevail; and (2) the resulting model must be useful to the problems at hand. The final conceptualization is a piecing together of current decision theory and its application to the planning situation. A literature review makes up the body of the document, followed by the proposed model and a summary of its shortcomings and implications. (LN)

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CONSIDERATIONS OF DECISION THEORY IN THE RECONSTRUCTION OF LOGIC IN URBAN PLANNING

By

Michael Dennis Hock

EVALUATION CENTER
THE OHIO STATE UNIVERSITY
College of Education

EA 002 613

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A Report

by

Michael Dennis Hock

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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CHAPTER ONE: INTRODUCTION

INTRODUCTION

Decision makers charged with taking courses of action for the public have come under increasing pressure from many persons to make their decisions more rational.* (If one contends that the pressure is only to make the decisions appear more rational, the truth or falsehood of the contention does not diminish the pressure.) Urban planners are a member of the group of public decision makers--though on the periphery of the group--for they make or strongly influence decision making for public action directed toward the future. Hence, planners too have come under increasing pressure to act rationally. The complexity and fluidity of the social systems which are the context of public actions are, however, strong deterrents of the search for rational actions by decision makers. In addition, the political process often seems to have at its core a "situational ethic" which allows concepts of rationality to shift with the decision making situation. Thus, the questions besetting public decision makers are three: 1) what are the terms of rationality, of agreed reasonableness or understanding, in any given set of circumstances; 2) what are the most appropriate means of determining reasonable actions; and 3) what are the most reasonable, or rational, means of attaining specified ends in public affairs? This report is an attempt to delve into decision making theory to determine if a theoretical base and means can be found for making public decision making--in the form of urban planning--rational in terms understandable to modern society, and appropriate to the context in which planning must be undertaken.

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*according to Webster's Third New International Dictionary, "rational" is defined as "having reason or understanding," or "agreeable to reason," while "rationalism" is defined as "a view that reason and experience rather than the non-rational are the fundamental criteria...."

STATEMENT OF THE PROBLEM

The practicing urban planner who claims to be able to aid others in making rational decisions (or even make them himself and have properly-constituted authorities ratify them and implement action) is often and sometimes continually confronted with the request that he justify his claims. The justification most often takes the form and content of a reconstruction of the logic employed by the planner, followed by a defense of that logic as an appropriate logic for use at that moment. The defense must focus on those questions outlined in the previous section--what is reasonableness, what is the most appropriate means of determining reasonable action, and what is a reasonable action for this situation. The ability of the planner to answer these questions forms the basis of his claim to aid decision makers; his inability to answer them reveals the nature of the problem faced by this report.

The nature of reasonableness is like the nature of good--it is completely determined by the situation in which a decision maker finds himself. Discussing the choice between programs of high employment resulting in inflation and those which lower employment but decrease inflation, Braybrooke and Lindblom point out that "the analyst [here, either the planner or the decision maker] as a practical man prefers and will actually choose a high level of employment in some situations and not in others."[1] What once appears reasonable may change, it can be seen, to fit a new situation. Similarly the choice of a reasonable action for a situation is intimately related to that situation. Definitions of a problem, constraints on solving it, and available resources are all components of the situation to which actions must be related. Questions about rationality must be dealt with, however, for public servants are certainly accountable for their actions--the fact that some officials have never been challenged does not negate the fact of their accountability. What appears to be needed to defend claims of rationality, if reasonableness and reasonable actions differ from situation to situation, is some systematic manner of dealing with planning problems which can be defended as being reasonable.

Several possible positions can be taken on the defense of rationality. As Bolan has observed, "until recently, city planners have felt that because the policymaker could not, or would not, adopt the planners' view, community decision making represented something less than optimum rationality."[2] The planner has discovered, however, that community decision makers need not respond to the planner's view of rationality; indeed, the planning process can be ignored if a decision maker so wishes. The planner must make his skills and his logic relevant to the needs of the decision maker, and defend his rationality.

The planner may defend his actions from a visionary base: he may point to his plans as being the manifestation of some particular ideology, or of some utopian scheme. However, such a defense rests on points distant from the experience of most men, and on points nebulous when they are a part of experience. Ideologies and utopias are often grand but vague, with global goals as part of their logical structure. The fault of a visionary base is distance. The planner may also choose to defend his rationality on the grounds that he knows better than does his challenger (or client) what the public interest is; he is then a base of knowledge of the public interest. The methodological problems involved in proving such a contention are enormous, however. Altshuler in discussing what he terms general evaluative rationality points out that knowledge of the public interest is the defense of wise men and politicians, and at present has no valid technical base.[3] The planner may also defend his rationality on the basis of substantive expertise. For such a defense the planner must stake out and prove himself an expert in some specialized field. He may also exercise the option of becoming an expert in coordination or comprehensive planning. However, if the planner chooses the first, he perforce loses his claim to being able to provide an overview of public activities from an unbiased viewpoint. In addition, he often lacks the practical skills needed for taking such a position. If the planner chooses the second option, he runs the risk of becoming an administrator-decision maker, a decidedly different role than that commonly granted to planners-as-designers-of-solutions. If the planner chooses the latter option, both the definition of the task and the planner's ability to undertake it are strongly challenged. If a position taken on any of these bases discussed--vision, knowledge of the public interest, or substantive expertise--is strong enough to carry a defense of the planner's rationality, it is often a relative defense tied closely to the nature of the situation at hand. Such defenses, however, do not appear capable of sustaining confidence in the planner's rationality in many diverse situations.

A fourth type of defense is possible in support of rational planning.* The planner may defend himself on the basis of procedural or technical rationality. Such a defense would illustrate the objectivity of the planner by exposing his logic of problem solution (that is, its reconstruction) and making explicit the assumptions underlying the logic. The rationality of the method would be based on the effective use of planning information within the constraints of information availability. In short, the planner would defend himself by outlining how he made his decisions, and by illustrating the nature of the forces constraining him and how he dealt with those forces. It is this last base which seems to bear the greatest promise for providing a meaningful and general justification for the planner's actions.

Planning behavior in metaphorical terms appears to be a family in the more extensive class of decision making as a mode of behaving. Planning can be defined as the construction of a set of decisions for action in the future. As do other types of decision making, it involves "intelligence" and "design" activities culminated by "choice," and as a process follows the general steps suggested. When discussed here, "planning" will mean urban planning as an institutional mechanism of local government, and "decision making" and "planning" will be used interchangeably to refer to the process of planning. (Similar usage will be made of the terms "decision maker" and "planner"; both refer to participants in the planning process.)

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*enumeration of these defenses ought not imply that the listing is exhaustive, but rather that it is an attempt to include major types of defense. In addition, it ought to be noted explicitly that the discarded defenses are inappropriate only to the planner who wishes to take as comprehensive and deeply analytic a view of the problems confronting his client as is possible.

Planners are concerned with rationality, risk, uncertainty, comprehensiveness, time horizons, and many other issues which are mentioned with great frequency in the literature of decision making. In addition, the steps in the planning process mentioned in urban planning literature appear similar in form and content to the steps of the decision making or problem solving process. John Dyckman, summarizing early work in the field of decision making and attempting to relate it to urban planning, made the claim that most planners see planning as a form of deciding.[4]

The study of decision making has focused upon determining the means, variables considered, and constraints upon completing a varying number of steps required in reaching a decision. Inquiry has been directed toward various types of decision makers in different personal and institutional contexts, toward persons holding different value positions, toward persons with different degrees of knowledge about the world in which they must act, and toward persons with differing capabilities for influencing their environment. A great deal of work has been undertaken to describe the processes of decision making in business situations, in military units, and in various public agencies.*

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*an annotated bibliography containing much of this work can be found in Wasserman, P., and Silander, F.S., Decision Making: An Annotated Bibliography (and Supplement), Ithaca, N.Y: Cornell University Press, 1958 and 1964.

The steps which these persons are generally believed to follow involve determination of goals or objectives to be accomplished, generation of actions for attaining those objectives, choice of a course of action, and commitment to or execution of that action. These steps are paralleled by a process of gathering, organizing, analyzing, and reporting information and admitting it into the steps of deciding as necessary. It appears that two mechanisms exist for completing the process of decision making. At the one extreme is the mechanism of making decisions by judgment. A man, without a set of guidelines or a methodology laid out for him, wades into a problem situation and by insightful reasoning, using hunch, and employing his creative faculties, the man makes a decision. At times, such decisions may seem like whimsey; however, the job of deciding has been accomplished. At the other extreme is the mechanism of methodical and extensive examination of all available evidence. Such a mechanism usually reflects a concern for scarcity of resources with which to solve problems, a commitment to fully understand problems before deciding what to do about them, and a commitment to proceed reasonably. This mechanism has a value base in those values of science which place a premium on sound, logical resolution of problems after thorough consideration of all available evidence. It is, to paraphrase a thought of John Dyckman, the heritor of the tradition of the Enlightenment, with its optimism and belief in the efficacy of rational methods. This second mechanism postulates that man can do a better, or at least a more appropriate, job than that type of deciding represented by the judgmental mechanism.

It is a truism to observe that citizens in the United States expect their public officials to make decisions which appear to be directed toward a sound, logical resolution of problems. Citizens, in short, expect their representatives in public affairs to use the second of the two methods of decision making outlined above. Planners from their beginnings as a profession have been dedicated to a similar goal of rational or reasoned decision making. Thus, it appears that a defense of planning rationality built upon a model of rational decision making behavior could provide justification for the planner's actions and recommendations; such a model could reconstruct the planner's logic.

However, there has been much criticism of the use of the "rational" model of decision making as a descriptor of behavior, either in psychological or in organizational terms.[5] (This model will be analyzed more carefully in a following section of Chapter 3.) Indeed, "it is not always clear whether the proposed theories are intended as explanations of the way in which people do make decisions, or whether they are intended as helpful guides for improving decision making."[6] The criticisms of this model are based mainly on its unreality as a descriptive model and its lack of utility as a normative model--it is too far removed from psychological and political realities to serve research well or inspire decision makers greatly.

A model of the decision making process is needed which will integrate concerns for rationality, norms of planning behavior such as a desire for comprehensiveness (both temporal and substantive), and the growing body of findings describing decision making and planning behavior. Such a model must reflect the decision making behavior of planners as exemplified by the descriptive and normative statements of Chapin,[7] Altshuler,[8] and Meyerson and Banfield[9] among other influential writers on urban planning. However, no universally applicable model exists for providing comparative descriptions of the planning process. Neither is there a theoretical construct for assessing the relative goodness of different strategies or cases of planning behavior. Without such a model it appears difficult to make claims concerning the soundness of one's procedures for planning--claims for procedural or technical rationality. Braybrooke and Lindblom[10] deal with planning only for incremental change--only a part of the sphere of planned public actions. Friedmann's[11] conception deals with planning for innovative change--again, only a part of all planned public actions. Davidoff and Reiner[12] appear to have come the closest to creating a model to fill the need here identified, yet their work is not easily translatable to a step-by-step conceptual framework for reconstructing the logic of decision making for public view, nor does it suggest clearly a set of criteria for qualitatively differentiating between examples of planning.

In summary, to justify the actions of planners on the basis of procedural or technical rationality, a conceptualization for reconstructing the planner's logic is needed--yet no such model of decision making has been produced which might be fitted to the planning situation. It is this problem to which this report addresses itself.

THE PURPOSES OF THIS REPORT

Differences among models of general decision making and the process and product of urban planning will be used to provide a starting point for exploring the nature of planning logic. The major objective of this report is to define the essential logic of the process the planner and decision maker profess to follow. By examining the context of the decision maker's and planner's work--the values which these persons espouse, and the assumptions made about the state of the world and those who act in it; by examining the inputs to the process of decision making and planning--the type, certainty, and organization of knowledge which persons deal with; and by explicating the process of decision making and planning--the step-by-step production of decisions and plans, it is hoped this study will enable planners to suggest new components of a theory of planning as a form of decision making.

The major instrumental objective of this study is to relate (and integrate where possible) the models of man deciding with the concepts and techniques ("principles") of planning which now compose planning theory. Relations and integrations will be illustrated where necessary by case studies and hypothetical examples of planning, so that a planner can more easily relate his experiences to what is being said here about the nature of planning. By these means it is hoped the planner can categorize planning activities according to their use of one or another of the models of decision making mentioned here.

An indirect objective of this study is to provide a conceptual framework which will allow the planner to be able to pick appropriate planning strategies given different contexts, inputs, or products required in the decision making setting, to pick new methods, and to generate new tools and techniques for those strategies and methods.

To summarize these objectives, and frame them in the realistic setting of an agency whose task is to aid decision makers to become more rational, what is being proposed is to look at decision making theory to see if there exists some conceptualization of decision making for planning which can be varied to fit the context in which decisions must be made. The reason for looking in this direction is that once planning has been fixed in its institutional framework, it often cannot change or adapt to new demands easily; the same is true for fixed communication patterns. Yet because the environment in which decisions must be made is constantly changing, planning methods and the justification for their use may well have to adapt to shifting issues and decision problems. It is hoped by undertaking this report that new and creative ways of conducting planning activities within one agency can be found, and guidelines formed allowing planners to react freshly to each new planning situation to size it up and analyze it, and then to choose the most appropriate means for dealing with it while at the same time allowing planners to justify their actions by reference to a set of basic concepts about the nature of decision making and planning.

THE QUESTIONS TO WHICH THIS REPORT IS ADDRESSED

Given that planners must reconstruct the logic of their work to gain credibility for their clients or themselves, a number of questions must be asked about how work in decision theory relates to this need. (It seems inappropriate to formulate hypotheses about such relations, for the present work is exploratory and synthetic, rather than seeking to verify truths about hypothesized relations.) The questions which are the focus of this report are as follows.

1) What is the context within which planners must work?

2) What are the inputs which planners introduce into the "planning process" in order to create a plan?

3) How can existing models of decision making behavior and fragments of decision theory integrate identified context and input factors into a logical and usable whole (as these latter two adjectives are discussed in the following sections)?

4) If existing models and theory (taken independently) cannot suffice for justifying varying behavior, what kind of heuristic framework (conceived in part from generalizing from existing models and theory) can be constructed for viewing various bases of logic in order to choose appropriate planning strategies?

5) How does such a conceptual framework, for viewing decision processes, available models, and theory, adapt (1) to diverse planning situations, and (2) to various schools of thought about planning strategies?

These questions will be dealt with sequentially throughout this report, and a summary and discussion of implications of the findings will conclude the work.

GENERAL CRITERIA FOR A CONCEPTUALIZATION OF THE PLANNING PROCESS

To build a model (or a conceptual framework), or even look at its pieces, criteria for selection are necessary. The position implicit in this report is that a model of the planning process ought not to be only a normative model of prescriptive principles. Even though one's actions may be generally congruent with such a normative model, it is often necessary (because of situational constraints) to act at variance or odds with absolute principles in the model. For example, though a model may contend a decision maker should take a (defined) comprehensive viewpoint, or interact only with certain participants in the decision making process, it is often quite likely the decision maker will be unwilling or unable to bear the cost of such actions. At these times, the value of a normative model diminishes because of its lack of a rationale for deviation from the norm.

Rather than a normative model which would of necessity be highly complex or ingenious to tell a decision maker when to make situational adjustments, what is needed is a simpler, more behavioral model. Such a model in a behavioral form ought to provide for striving toward the norm (to allow for a continually "becoming" more rational), and also provide a measurement stick for assessing deviations from the norm. A model midway between the purely descriptive and the normative is the most appropriate model for situations encountered in planning.

Two general criteria have been selected to serve as a standard for building a conceptual framework for the planning process. These criteria are derived from two sources: the traditions underlying scientific inquiry, and the need to apply findings from inquiry to a concrete problem. The first criterion is chosen to insure systematic continuity between this work and other social science research; the second is chosen to insure the utility of what is conceptualized.

The general criteria are:

1) Logical consistency. A model must be consistent in itself and in its links to other models or theories in the same context. This consistency is a logic of justification, serving to show that one component of the conceptualization is systematically justified by contextual

assumptions and the nature of the model to that point. (While this criterion includes truth within its bounds, it is not assumed that each component of the model will be empirically verifiable in and of itself; rather, some components of the model will be logical extensions of the other components, deriving their truth from those parts.)

2) Utility. A model must have some usefulness, some applicability to a problem at hand. In Kaplan's terms, "the question of how we ought to think surely depends upon what happens when we do think in a certain way."[13]

These two criteria, when applied to the context of planning, (expanded in the following chapter) serve to generate specific criteria for assessing conceptualizations of planning behavior.

SPECIFIC CRITERIA FOR A CONCEPTUALIZATION OF THE PLANNING PROCESS

Specific criteria for a conceptualization of the planning process generated by the previous concerns are:

1) Normative-descriptive. An appropriate model will be both normative and descriptive in nature, bridging the gap between theory and practice. Such a criterion would be met by a model which is psychologically and sociologically descriptive, but leads logically to a state where all the norms of planning are described and met. In Meyerson and Banfield's words,

> ...we are ultimately interested not in how plans are actually made, but in how they would have to be made in order to be most effective (the very idea of planning... presumes that there are ends to be attained or maximized).[14]

In this case, then, logic is normative as contrasted with the findings of behavioral science as descriptive, but the norms are grounded in the logic of what is or can be described. An appropriate model should embody both the real and the ideal of planning.[15]

2) Accomodative-explanatory. An appropriate conceptualization will incorporate a range of purposes of planning; illustrate a range of forms which planning may take and explain their differences in specified terms; provide a link between planning and other forms of decision making (for example, programming, budgeting, and management or project control); and be universal in its possible application to many types of planning (urban, business, education, economic, military, and personal investment, to name a few diverse types).

3) Value neutrality. An appropriate model will accomodate a range of values underlying decisions made to plan and made in the planning process; it will not depend on any particular political ideology or system. The technical inputs to the process will encompass all of a continuum of technical scope, ranging from issue-generated analysis to systems analysis. Criteria for inclusion of premises (i.e., for responsibility of inclusion) generated by various participants must come from another theory (for example, a theory of the public interest); the model, however, must be able to accomodate such participation and premises so submitted.

4) Factual verification. An appropriate model will be capable of validation through comparison with and inclusion of behavioral science research findings; it will be further validated by proving operable under

a range of systems of decision premises, including fully-constrained decision systems with almost certain facts and values--such as PERT and linear-programming systems; partially-constrained systems with some uncertainty in them--such as portfolio investment systems; and threshold-constrained systems, with a rather high degree of uncertainty in them--such as would be exemplified by many city planning problems.

5) Rationality. An appropriate model will provide a measure of rationality as a function of the planner's adherence to the processes of the model and the type and amount of information used to construct a plan. The model in addition will be capable of accounting for non-rational elements in the planning process--among them judgment, intuition, and invention. Rationality is considered to be the use of information in objective fashion to attain specified ends in accord with the constraints of a given context. Thus, rationality is relative to the situation in which the planner finds himself, and is defined more fully as containing factors are added to the situation. Objectivity is attained by explicating assumptions and value choices made in the generation, organization, selection, analysis, and use of information for planning purposes.

6) Closure. An appropriate model will describe all of the essential steps in the planning process, their informational content, and their linkages to other steps. In addition, a model must be capable of being modified to accomodate the process of planning--to allow for the achievement of one set of fixed goals with one set of available means, then incorporating an evolution of means and ends.

7) Productivity. An appropriate model ought to be capable of generating plausible hypotheses about the nature of planning in different contexts for different purposes, as well as generating potentially useful strategies for planning with diverse participants.

8) Participatory inclusiveness. An appropriate model ought to be capable of accomodating a range, and a group, of participants in the decision making process, and provide a plausible mechanism for incorporating a number (possibly contradictory) decision premises. This criterion is injected to recognize the existence of a number of participants with legitimate rights to hold views, consult, advise, inject premises, or otherwise be involved in the many situations of a public planning process.

9) Information cost. An appropriate model will recognize the costs and differential benefits of gathering, organizing, analysing, and reporting planning information. The validity, reliability, and availability of planning information in agencies does much to make the achievement of some normative level of planning behavior possible, and the cost and quality of information must therefore be a major component of justifying planning activities. Given any event which will occur in the future about which planners are concerned, information and uncertainty about the event are directly related to the number of possible outcomes that could occur. Uncertainty and information are considered interchangeable: the "amount of information in an event is exactly equal to the amount of uncertainty residing in that event before its occurrence."[16]

A NOTE ON THE CONCEPTUAL FRAMEWORK OF THIS REPORT

A multitude of means exist for viewing decisions. In carrying out this research and snythesis, a choice has been made among means for organizing thoughts presented here. Decisions and processes of decision making have been viewed in the report according to the certainty and uncertainty of premises and the steps in admitting those premises to decision making. This means of organization has been chosen in the belief that public questioning of the certainty of planners' actions is most responsible for the current turmoil over how to justify the planners' methods as an aid to decision making in public affairs.

Among other means for viewing decisions and research related to the process of deciding and planning are concepts of individual and group decision making; of long-range investment and short-range operating decisions; of organizational levels involved in deciding; of the degree of time pressure confronting decision makers; of the magnitude of possible results of decision (as in studying "incremental" and non-incremental changes, or adaptive or developmental actions); of one-time and repetitive decisions; of policy-setting and policy-implementing decisions; of feasibility and optimization decisions; of anticipated and unanticipated decisions; and other concerns not part of this author's experience. These means have value, and a number of concepts described in this report are listed here. However, it is believed none of these means come so close to the crux of the problems facing planners: how to make reasonable decisions and reconstruct the logic behind them.

THE ORGANIZATION OF THIS REPORT

Following this introduction, the report will be organized as has been implied in the purposes outlined for the work. First, the decision making and planning context and its implications for reconstructed logic will be discussed. Assumptions about context which are made in models of decision making and the practice of planning will be examined. Second, inputs to the process of decision making and special inputs to the process of planning will be discussed, as forces which impinge upon models for reconstructing planning logic. Third, the process of decision making itself will be discussed in theoretical terms. Models of the process will be surveyed, and details in the process examined within a framework for viewing the process. In addition, dynamics of the decision process will be outlined. Finally, a synthesis of what has been said concerning contexts, inputs, and processes of decision making and planning will be related to existing views of planning as a mode of behavior, to form implications for a theoretical base for planning, and a practical base for development of new tools and techniques to aid the city planner in his search for a means to more rational decision making in public affairs.

CHAPTER TWO: THE CONTEXT AND INPUTS OF PLANNING

THE IMAGE AND DECISION MAKING

1) Action and interaction with the environment. Philosophers have long discussed the question of what is reality and what is its relation to man. The question has not been answered. Whether reality is separate from man is determined within him in or on the surface of his brain, or in some combination (or redefinition) of internal and external "reality" has been questioned constantly. Never questioned, however, is the relationship which motivates the questioning of reality. There is always an "I" and an "it" (that which is not-man) and some perceived interaction between the two. It is this perception of "I" and "it," and their interaction, which will be called context.

Context--what is around man--is the first step in any inquiry, for assumptions based on it are necessary antecedents for the next steps of the inquiry. One of the points in these assumptions which must be investigated is the distinction between saying man influences his environment, and saying man can influence his environment. The import of this distinction for deciding and planning is simple. If a man merely acts, there can be no control by man, no shaping of the act, for it is determined by the context--indeed, all men are so determined. Thus, man is powerless. On the other hand, an assumption that man may act allows for a conscious study of the occasion for action. One assumption allows man to act; the other allows him to study decision making and planning. It is the second assumption which decision makers and planners make; it is this assumption which creates a paradox in planning.

The action of planning, as it is here understood, deals with making a set of decisions for action in the future. Generally, in the United States, planning is a staff function of government provided by an agency with varying powers. Typically, however, the planner does not implement his plan--or have final responsibility for his acting out the decisions he planned. There are, of course, instances where the responsibility to act is delegated to the planner. Most often, however, the planner is an advisor to decision makers who themselves are responsible for the action of commitment to and implementation of a plan.

The planner must somehow accommodate the decision maker's commitment to conscious action in his plans. St. Paul's planners (in Altshuler's words) did not frequently have grounds for believing their government would intervene to alter ongoing trends.[17] Hence, their actions were directed toward helping the inevitable occur in a more orderly fashion. Their assumption was, however, that man (1) could know (increasingly) what would be inevitable (based here on trends of past events being projected into the future), and (2) could act accordingly. Even this pessimistic view (in terms of values of change) embodies an assumption of action.

The paradox, spoken of earlier, is this. Planners have their intellectual roots in the Enlightenment (among other points in the history of ideas). They wish to bring people a better city, a city that people want but have not the means to obtain. Yet men in an optimistic atmosphere, where the commitment to change is strong, seldom know what they want except as it is a slight modification of what they know. When asked for their wildest wishes, so they might be fulfilled, people tend to ask for what looks like an extension of past trends. Hence, planners acting for the people create a utopia in the image of the past. Planners cannot propose inexperienced utopias; such proposals demand evaluation based on a style of life which is not part of their clients' experience. What is needed to resolve this paradox is a model of planning which admits both past trends and utopian ideas to the process of planning, with both of these information components tested for their meaning and worth prior to using them in decision making.

2) The nature of an image. The view of psychologists concerning human action can provide much in a study of decision making. The most simple view of human action is taken by reflex theorists, who hold that human behavior is a chain of conditioned reflexes, with new reflexes formed through experience. This view and the theory supporting it underlies the first assumption about action: man (re) acts. Out of this assumption has come behavioral psychology and behavioral therapy, with their assumptions of the manifest being reality and associated techniques of operant conditioning. The paradox for planners to resolve, however, is that a leading proponent of this school of psychological thought, B. F. Skinner, is in a sense a planner. His now-classic book, Walden Two, portrays a society quite like nineteenth-century utopias, wherein people have a great deal of opportunity, have a sense of freedom, and find a strong sense of community. Yet as Skinner himself pointed out,

> The uneasiness with which we view government (in the broadest possible sense) when it does not use punishment is shown by the reception of my utopian novel Walden Two. This was essentially a proposal to apply behavioral technology to the construction of a workable, effective, and productive pattern

> of government. *It was greeted with wrathful violence.* (italics added)....
>
> One would scarcely guess that [the critics] were talking about a world in which there is food, clothing, and shelter for all, where everyone chooses his own work and works on the average of four hours a day, where music and the arts flourish, where personal relationships develop under the most favorable circumstances, where education prepares every child for the social and intellectual life which lies before him....What is wrong with it? Only one thing: someone 'planned it' that way....No matter if the planner of *Walden Two* diverts none of the proceeds of the community to his own use, no matter if he has no current control or is, indeed, unknown to most of the other members of the community (he planned that, too), somewhere back of it all he occupies the position of prime mover. And this, to the child of the democratic tradition, spoils it all.[18]

This paradox--the rejection by planners of assumptions upon which these actions are based--has not been resolved by the profession of planning. No comment on it has been made. It is true that many statements of the worth of freedom, opportunity, and community have been made and amended with the reminder that these concepts must be balanced in practice with means of attaining them, but resolution has not been attempted. A rule of thumb is not particularly enlightening when the possible contradiction is this obvious.

A more complex view of man is the notion that how an organism behaves is dependent on how an event is "pictured" in some internal representation of the organism and its context. It is this second view which Miller, Galanter, and Pribram hold.[19] Taking as their point of departure Kenneth Boulding's introspective little book *The Image*, the three authors develop a theory which seeks to answer the question of what worth such an internal representation of context might have as a working concept. It is certainly an intuitively pleasing concept; one has only to consider the self-evidence of their introductory paragraph.

> Consider how an ordinary day is put together. You awaken, and as you lie in bed, or perhaps as you move slowly about in a protective shell of morning habits, you think about what the day will be like--it will be hot, it will be cold; there is too much to do, there is nothing to fill the time; you promised to see him, she may be there again today. If you are compulsive, you may worry about fitting it all in, you may make a list of all the things you have to do. Or you may launch yourself into the day with no clear notion of what you are going to do or how long it will take. But, whether it is crowded or empty, novel or routine, uniform or varied, your day has a structure of its own--it fits into the texture of your life. As you think what your day will hold, *you construct a plan to meet it*. *What you expect to happen foreshadows what you expect to do*. (italics added)

The crux of the three authors' thoughts is in the final two sentences of this excerpt. However, the unanswered question is implicit in their next sentence: "...the plans you make...*probably* have some relation to how you actually spend your time during the day." (italics added)[20] The unanswered question?--how does the image work. The schema, the cognitive map, the image, may admit realization and may permit abstraction and the generation of hypotheses, but action is not *caused*. At the least, this second view of psychology leaves much to be desired if we are to justify the assumption that man may act.

In the last analysis, the assumption of being able to do as we will is an *assumption*. Skinner makes it when he sets up one planner over his community; it is important for the others who buy it--decision makers and planners--to see they have purchased a package that may well be empty.

The planner, like the man in Boulding's *The Image*, has a cognitive "picture," a schema representing his interaction with the environment.

The most complete existing textbook for conducting the process of urban land use planning has at its core a conceptual scheme illustrating an uncontested notion of the operation of the planner's image. In Urban Land Use Planning, F. Stuart Chapin expresses his view of how interaction with his environment shapes his values, while at the same time his values shape interaction. He notes

> Human behavior is two-directional. It conditions and is conditioned by this environmental setting, and in turn, actions in relation to the setting motivate and are motivated by values, both the unexpressed subconscious values and the expressed conscious ones....These values and ideals, whether latent or manifest, are the product of human experience in a specific cultural, economic, and physical setting, and consist of a kind of superstructure built around the basic drives of human life (survival, procreation, etc.).[21]

Chapin then proceeds to link value-motivated behavior of the kind described to the act of planning. He first identifies needs and wants as antecedent values to behavior seeking to influence land use in pursuit of particular social desires. (Needs are values concerned with the necessity of urban life, while wants are values concerned with economic and social desires which supplement the necessities of urban life--not an entirely clear distinction, but heuristically helpful as a base of explanation.) Action in Chapin's schema involves a four-phase cycle: 1) experiencing of needs and wants; 2) defining goals; 3) planning alternative courses of action; and 4) deciding and acting. The outcome of this course of action is a plan, selected and set in motion to achieve the goals. Changes resulting from the planned action, however, may produce new values (from a new base of experience upon which values may be formulated). The new values may then create new notions of "need" and "want," and the cycle of planned action proceeds to follow a circular or spiral sequence of the same steps.

Chapin's schema is analogous to that of the psychologists, for it has a view of the system within which man acts, and a set of things (or a mechanism for arriving at those things) which man likes. In addition, those components of the image are culturally determined. In short, those planners who subscribe to the view of Chapin, knowingly or unknowingly, see the world as it is outlined here, and act upon it as conscious decision makers. Planners in Minneapolis[22] believed the same process ought to guide their steps: they first attempted to formulate a set of goals, then move toward action on plans. Generally the same process seemed to be followed in St. Paul,[23] in the construction of a land use plan, although in that instance the components of need and want were almost entirely in the minds of the planners; few outside sources of reference were sought. (This point will be returned to later in this paper).

The image upon which man's actions are predicated is composed by a number of forces operating to organize those things which man perceives: his facts and values. These facts and values, discussed more fully later, are experience-based, and given meaning by man's interaction with other men by means of social learning. It is this interaction, in an institutional context, which will be looked at shortly.

FACTS AND VALUES AS INPUTS TO DECISION MAKING

Two major components are necessary to use a model of the decision making process: the values and facts describing a system in which action must be taken. To fully understand the workings of present models, these components each must be studied. Herbert Simon has synthesized (rather generally) what are the three characteristic and essential acts of deciding: he calls them intelligence, design, and choice. Each of these acts (actually composed of many acts) deals with some operation on a concept of the environment. Thus, it is a logical first step to clarify how man depicts his environment.

1) Facts. As man interacts with his environment, he forms an image.* That image, of the form and content of that which is around him, may be formed by direct observation or by accepting the reports of other persons. Facts are the matter of which the image is made. A fact (in operational terms) is some proposition about the content of man's environment, or some relation among parts of that environment, which may be disproven. As the number, complexity, and similarity of man's experiences increase, he forms concepts--simplifications of facts to certain of their essential features--to combine and arrange facts in order to manipulate them more readily. As new content or relationships are formed by this manipulation, new facts may arise, or new constructs, theories, or laws. In such a manner, parts of man's image evolve.

An obvious distinction is being made between perceived and real environments. A discrepancy can exist between what is real and what a man believes to be "fact." In such a case, the truth or falsehood of what a man believes to be a fact will not become apparent until the fact is tested against "stern reality"--until the fact serves as a guide to acting. At such a time, theoretically, the false fact will be disproven and the actor will revise his other perceived facts as necessary. (Whether the revision must be consistent will be discussed in the section of this chapter on values.) In the extreme case it is possible that the false-fact-creator will not survive; this notion, of course, underlies the sometimes explicit and questionable assumption in decision theory that only the rational survive. Viewing what has been said from a point external to the decision maker, it is possible to see that a layer of perceptual skills and cognitive abilities separate the inner decision maker from the "real" environment outside of him. However, what is seen as real is a crucial input to decision.

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*the manner of construction is not an issue here; an overview of the process of conceptualization, however, can be found in Bruner, J., Goodnow, J.J., and Austin, G.A., A Study of Thinking, N.Y.: Wiley, 1956.

It is this path of reasoning which, in part, leads Simon to take (as this writer does) the individual decision premise--the input to decision making--as the unit of description and focus in studies such as this. To illuminate the nature of the factual decision premise, Simon observes

> The decision maker's information about his environment is much less than an approximation to the real environment... "approximation" implies that the subjective world of the decision maker resembles the external environment closely, but lacks, perhaps, some fineness of detail. In actual fact, the perceived world is fantastically different from the "real" world...involving both omissions and distortions...in both perception and inference. The decision maker's model of the world encompasses only a minute fraction of all the relevant characteristics of the real environment....[24]

It is the final notion of relevance that Simon introduces which serves both as a link to values and a guide to further investigation of facts as inputs to decision making. First, the link to values will be made, and then left. Perception, the means by which the environment is experienced, is notoriously selective; this active selection is a result of physical and social forces directing attention to a particular part of the environment. There are strong social forces supplying a basis of perception--exemplified in the anthropologist's concept of "world view"--which integrate all man's social experience (fact and value) to dictate what will be accepted as experience perceived. While perception is a process which itself is based partly on values, this ought not to be taken as meaning intelligence activities in decision making, in order to be "scientific" or "value-free," ought to ignore certain pieces of evidence. It is not being said that values are sufficient to establish facts; rather, they are a necessary condition. Keeping values out of any analysis is at best a misdirected, and perhaps even hopeless, methodological venture. The problem for methodology of intelligence activities is not "whether values are involved in inquiry, but which...."[26] The device for controlling values when determining the relevance of facts is to face valuations squarely and introduce them as explicitly stated, specific, and sufficiently concretized value premises. The manipulation of facts during this process should result in a conception of what the environment is, and a conception of what it ought to be (or at least ought not to be).

Back, then, to facts. Intelligence activities in decision making may be thought of as processes for scanning the environment to see what matters require decision. It is often said that facts are derived only from observations, while laws and theories are products of conceptual processes. Yet while there _is_ a sort of distinction between facts, laws, and theories, it is unsound to separate them in this way. _No_ observation is free from conceptual contamination. Rather, it must be remembered that we take

> ...what we perceive as being of a certain kind, bringing an abstract concept to the perceptual situation and subsuming the concrete given under it. Because of this tacit predication, the eye with which we see is itself the mind's eye, or it would be indeed unseeing.[26]

Intelligence requires a notion of a system, or a schema, into which "relevant" facts are fitted, to the end of describing a set of relationships which when interacting tend to produce some entity or move toward some goal. Thus, a bird singing is a system producing a sound; a man deciding is a system tending toward some action; a church is (or might be) a system producing stable men or a system trying to understand man's relation to man and his gods; an economic system might be a system tending toward minimizing inequalities of income distribution; and so on.

It is this system which the decision maker scans to see what matters require decision (after he has constructed the system in his mind). A system may, certainly, have many goals and procure and produce many things; it may be simple or complex in the relationships of parts which act or move to produce. The attending conceptual or symbolic representation of such a system may be simple or complex, and true or not true, as earlier discussed. Essential to the intelligence process is that the system of concern be _fully_ described--or, in more realistic terms (since what we are interested in is a reasonable statement), as fully described as possible.

The burden this systematic description places on decision makers is a weighty one. Dyckman uses the words of Talcott Parsons to suggest the particular flavor of a complete description of the total system:

> The rationalistic pole is the point at which it is claimed that *all the important elements of action can, from the subjective point of view, be fitted into this schema*, that is, are manifested to the actor either as verifiable facts about his situation or logically cogent statements of relations between such facts. (italics supplied)[27]

The trouble inherent in the "rationalistic pole" has two parts, both implied in the italicised phrase above. First, "important" is a dynamic concept, for its resemblance to "relevant," "meaningful," and "significant" shows it to be value based, and thus a function of shifting values. Second, "elements" are dynamic (over and above the dynamism of values in their facts). The shifting of elements in any system makes that system a more difficult one to describe, for unless the system is a rare one at equilibrium--static equilibrium--describing changes requires an analysis of how the system works.

This shifting of elements, and the shifting of systems themselves, is a key component in the revision of the planner's view of the urban scene. The "is" of urban affairs becomes real only from a "how it works" analysis; thus, in delimiting the urban system, "preoccupation with stocks of people, goods, buildings, and wealth [elements] is being supplemented with a growing attention to the *flows* of money, goods, services, information, and satisfaction...for it is these flows that shape opportunity and welfare."[28]

These relations, since they can shift or not, point to two conceptions of any system: a static and a dynamic state, or, more precisely, a stationary and a non-stationary state.[29] A non-stationary state in which a decision is to be made is exemplified by an environment (or system) in which change is occurring either as a function of a sequence of decisions or independently, or both. A stationary state is one in which an environment (or system) is not changing (i.e., is static) or behavior is controlled by some sort of statistical process, the characteristics of which do not change over time. Intuitively one can feel that analysis and description of stationary environments, or non-stationary ones responding to some act of the decision maker, is more manageable than working with independent and possibly random changes in an environment. Resolution of a decision problem appears less formidable in a stationary environment, but decision makers interested in effective decisions would do well to ascertain if unnoticed dynamics are relevant to their intelligence tasks, and whether the system is dynamic or static.

2) Values. Man acts to do those things which please him most or hurt him least. The self interest of a man as the dominating influence in his decisions to take action is at once intuitively pleasing and displeasing. It is pleasing because, among other reasons, it seems to allow for romantic individualism, and provides a rationale for a sense of ego enhancement. On the other hand, it is displeasing for it seems to connote selfish indulgence at the expense of others. Group self-interest, with the same connotations as personal self-interest, is similarly the dominating influence in group decisions for action. It is certainly not a new thought to observe that in any society the interests of the individual must be balanced against the interests of the group--the whole society--

when any specific action is to be undertaken. Persons charged with acting for a group, as planners are, must act to balance interests. The creation of this balance, however, is no mean feat. To understand the creation of a balance one must look at what makes up individual and group interests. (The balance between individual and group must be eyed with a sense of humor: what, after all, becomes of the group when it goes home?)

What we are interested in unveiling is the reason why individuals choose one action from among the actions available to them in any particular set of circumstances. The lack of functionalization (functional specialization) in biological man can be considered to result in the distinctive human feature of adaptability of man to the environment.[30] This feature also implies the capacity to act in light of expectations, but also implies the capacity (perhaps residual, but nonetheless an undeniable evolutionary feature) to act otherwise--in the extreme, to maladapt. Three concepts (at least) are needed to explain this paradox: value, belief, and impulse. These forces are influential on the outcome of decisions to act, in that they predispose a person to act in a certain way under certain circumstances. Yet they neither work in isolation or with fixed impact, nor are they completely isolable as concepts. Interaction and variation in value, belief, and impulse is great from person to person and from decision to decision, producing both adaptation and maladaptation.

Beliefs are "existential propositions held by individual human beings regarding the structure and operation of the social and physical universe and one's place in it." Expanding on this notion, the concept is the same as a fact, discussed earlier, and includes knowledge and power,* the latter "an existential proposition regarding man's perception of his relative capacity to influence and/or control the structure and operation of his social or physical world."[31] Additional beliefs of significance in group decision making, or decision making over time (especially in a hostile environment) are expectations of the response and assumptions of the intentions of other actors in the system.

Values are "normative standards by which human beings are influenced in their choice among alternate courses of actions they perceive...(i.e.,) what humans ought to desire."[32] Values, or human norms, are not _a priori_ universal, nor are all men bound by the same values in making choices. A strong distinction needs to be made between values and their "normative" character, and "norms" as connoting a standard which a social group, society, or culture adheres to. Values are standards allowing for behavior which results in socialization and antisocial acts, in individual action and group involvement.

Impulses include "various motivational forces, both innate and learned, which influence human action without regard to standards or propriety [values] or beliefs...."[33] Regardless of the nature or origin of an impulse, its influence on decision making is the same: decisions are made virtually automatically, almost as if by (or perhaps by) reflex action, and the logic of deciding is practically impossible to communicate to another human being. Impulse may be understood to an extent, as is reflected by our ability to name those things (among others) which are impulse influences of behavior. It is the automaticity of influence, the dictation of conduct, which isolates impulse from value or belief; impulse is beyond control of man's consciousness. Among identifiable impulses are compulsive needs and drives (biological, psychological, and cultural in origin), habits, and cathexis. Yet the "understanding" of this set of impulses stops with their categorizing; they are merely identifiable. Their nature seems illogical, and is perhaps a-logical. Thus, important limitations on this study will be imposed regarding impulse. Impulsive, a-logical influences on behavior will be assumed absent from the decision making process, even though they may be a major influence on the outcome of the process. Whimsey as a source of action will not be allowed to enter this discussion, for it is presently unexplainable.

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*the additional beliefs of "cognitive" and "appreciative" standards used by Jacob and Flink, cited in reference 31, have been omitted here, for while they deal with the validity and/or applicability (relevance) of information and the potential results of an act (in terms of gratification), they are believed to be meaningfully understood either as values or as impulses, and hence will be treated as such.

Having discussed beliefs-facts, and disposed of impulse, the nature of values should be further analysed, for values serve as the basis of self interest and, with facts, are major inputs to decision making. As explained, values arise in response to a new or familiar choice situation, and vary from person to person. They have their origin in secondary (cognitive) mental processes, and result directly from capacities of self-awareness and self-evaluation. In addition, values tend to have the property of continuity from generation to generation, due to forces of social learning and psychological and biological characteristics of the human being. (However, these same forces may make for change and discontinuity. Thus, values can, and do, change, though they tend to be stable.) Values possess the property of "selectivity," permitting the ordering of options of action in such terms as the person valuing and deciding will accept.[34] The holding of values induces self-evaluation or self-judging, providing each person with the means of assessing the propriety of his own conduct in reference to standards he has learned to apply to himself; thus, values provide a sense of personal imperative. Values in a similar way provide a person with means of self-inhibition, a restraint of improper actions by internal sanction. In addition, interests of groups are relevant to decision making, including national or public interest, class interest, special group interest, institutional or bureaucratic interest, and international or "universal" interest. In summary, a value is an internalized, highly selective, partly individual and partly social, possibly culturally determined, and forceful normative proposition, which says in effect: "In such and such a case, I ought to do or have X."

An important point needs to be made here, though it may be obvious from the preceding sentence. _Values_ and _goals_ are not the same things. To equate the two confuses values--criteria men use in deciding which things ought to be done or sought--with goals or objectives--things which are desired. If the two things were synonymous, there would be no way of determining what motivational forces of a normative character existed within the human being. Separation of the two allows values to motivate, and allows some prediction of goal choice in given choice situations.

In empirical analysis of values the notion of what is a value must be an operational one. Normative standards of conduct, rationalizations by a decision maker about what he thinks are his values affecting a decision, emotional expressions, cognitive expressions, or impulsive forces must all be accepted similarly in empirical research in decision making if these factors function as standards observable as indicating preferences among acts. The task confronting the decision maker, then, is to determine what are the facts and values in a given case.

3) Certainty of Facts and Values. It may be, as LeBreton has suggested, that the most difficult part of the entire decision making process is the determination of the degree of certainty to be assigned to significant variables (granting that those variables can be determined).[35] Certainty of the two broad classes of variables which enter into the decision making process--facts and values--is a great concern, as corroborated by several authors who state

> When an individual chooses between alternatives which involve uncertain outcomes it seems clear that at least two factors enter the decision: the degree to which the possible outcomes are desired relative to one another, and the degree to which the outcomes are deemed probable.[36]

It is the certainty, or uncertainty, of facts which is the first concern here. What must be done is to investigate the degree to which outcomes (facts) are deemed probable, or likely to occur. There are, as was suggested earlier, two types of reality: what exists in the environment, and what the person believes to exist. Similarly, there are two types of certainty: what is certain, and what the person believes to be certain. Many degrees of certainty exist and enter into the process of decision making.

An aside about proof of a fact needs to be made before proceeding with certainty. In logical terms, "proof" of a proposition may be made by deductive or inductive inference from other propositions. In such an instance proof is related to the goodness of the inference within existing systems of logic. However, the proposition from which other propositions are derived by deduction cannot be proven except by other propositions antecedent to it, or by experience--by the method of induction. Thus, because many outcomes cannot be experienced directly or indirectly, many propositions cannot be tested for their truth, or proven, and must be assumed true. These assumed truths--and here the reason for using "belief" as a synonym for fact is obvious--are quite vulnerable to debate and will be considered a non-fact component of decision making, to be pondered only when the individual resolves the value question of admitting such facts to decision making.

Facts tested by experience, however, are the facts which are admitted to all decision making. However, more than isolated facts alone are admitted. When a decision maker states "the problem in this instance is X," what he most often is really saying is, "I have seen facts one and two in this instance, have inferred that a is the case, and therefore believe the problem in this instance is X." It is this inference which is often the "fact" in decision making, and inference may be "true" to differing degrees. The "truth" in inference is a function of the number of separate instances of an event's occurrence which coincide with some general proposition encompassing the events. For example, if in one set of ninety-nine instances event "a" occurred each time prior to the one hundredth similar instance, one could state as a fact that in ninety-nine out of ninety-nine similar cases event "a" had occurred, and could then say that it was highly probable (or simply probable) that in the one-hundredth similar case "a" would occur again. Event "b" in an analogous set of ninety-nine instances, having occurred only sixty-three times, could easily induce one to say it was only somewhat probable (or perhaps less probable than in the former example) that "b" would occur again. It is with this component of decision making--the computation of probabilities--that decision makers must grapple.

Savage has distinguished three main classes of views on the interpretation of probability. These classes of views are the "objectivistic," the "personalistic," and the "necessary."[37] These interpretations have the following characteristics.

a) Objectivistic views hold that some repetitive events, such as tosses of a penny, prove to be in reasonably close agreement with the mathematical concept of independently repeated random events, all with the same probability. According to such views, evidence for the quality of agreement between the behavior of the repetitive event and the mathematical concept, and for the magnitude of the probability that applies (in any case), is to be obtained by observations of some repetitions of the event, and from no other source whatsoever.

b) Personalistic views or subjective views hold that probability measures the confidence that a particular individual has in the truth of a particular proposition, for example, the proposition that it will rain tomorrow. These views postulate that the individual concerned in certain ways is "reasonable," but they do not deny the possibility that two reasonable individuals faced with the same evidence may have different degrees of confidence in the truth of the same proposition.

c) Necessary views hold that probability measures the extent to which one set of propositions, out of logical necessity and apart from human opinion, confirms the truth of another. They are generally regarded by their holders as extensions of logic, which tells when one set of propositions necessitates the truth of another.

Since the essence of any decision is its combination of familiarity and uniqueness, yielding a mixed certainty and uncertainty of facts, some probability view is necessary which allows for the operation of human judgment to complete the process of decision making. Looking for such a view, the necessary view can be seen as an extreme personalistic view in which so many criteria of logical consistency have been incorporated that there is no room left for a person's individual judgment. Kaplan, discussing what he has called the a priori view (the same as what Savage calls the necessary view), points out that the notion of equiprobability must undergird the basic propositions made in our logic before further constructs can be made. Yet we must somehow know, for example, that the world is composed one-half of women and one-half of men before we can say of the next person seen (under set circumstances), the probability of his being a man is one-half. Kaplan goes on to say:

> The probability at which we arrive a priori may be grossly in error because of the effect of certain factors whose presence can be determined only by observation, or by inference from other empirical data. If experience supports the necessary assumptions, mathematical probabilities are by far the easiest to apply; but if we simply take it for granted...(that such is the case)...the mischief may already have been done.[38]

Decisions do not always deal with situations in which decision makers have had experience. The view of the objectivist, however, can be taken only with respect to experienced, repetitive events. It becomes meaningless to talk about the probability of a given proposition being true for the objectivist, for it either is true or not. Objective probability cannot serve as a measure of the trust to be put into a proposition, except in the case (a limited one) of inference about the truth or falsehood of past repetitive events. Kaplan, addressing himself to the characteristics of the "frequency theory" (the same notion as objective probability) points out that questions such as "what is the probability of nuclear war in the next three years?" pose severe problems for the frequency or objectivist position.[39] There is no sequence of nuclear wars to serve as evidence; and, if we create a slightly different frame of reference and look at a past sequence of warlike situations, we are forced to conclude that the probability is zero, for none of these was in the required sense a nuclear war. Especially troublesome, then, are the problems of the single case and the choice of reference class, for the objectivist position.

What is left is a less rigorous, but workable, notion: personal or subjective probability. Subjective probability is simply "a number (between 0 and 1) that represents the extent to which an individual thinks a given event is likely."[40] Individuals can freely choose any probabilities--subjective ones--they like prior to an event's occurrence. Yet subjective probability is not as whimsical as is implied, for it is a guide to action and hence subject to the evolutionary constraints on all behavior (thoughts on what survives being rational are overruled here).

The theoretical elaboration of the subjectivist view is found in the works of Thomas Bayes. The subjectivist holds that there is some prior information upon which to base a determination of probability in all, or nearly all, cases. It is the form of that information which must somehow be incorporated into a system for handling it, and the form is nebulous. The prior information is only sometimes like objective probability of an event; more often, the information is in the form of guesses, intuitions, or fragmentary information in someone's brain. By an introspective process this information can be recovered and used in Bayesian formulae.[41] (An example of the manner of use of this information will be seen in the section of this paper dealing with the learning model of decision making behavior.) Edwards and others have pointed out that "the Bayesian approach is a common sense approach. It is simply a set of techniques for orderly expression and revision of your opinions with due regard for internal consistency among their various aspects and for the data."[42] Such an approach would prove quite useful for a planner interested in reconstructing interesting, reasonable, and internally consistent logic.

What the Bayesian approach points out is that in confronting any situation, a decision maker interprets particular events, or action outcomes, in terms of his personal perceptions. Wilson and Alexis believe that evidence supports at least four factors influencing the determination of this basic subjective probability: 1) the degree of belief a person has in the "relative frequency" basis of objective probability; 2) the person's perceptions of objective probability of this event; 3) his evaluation of the importance of the situation; and 4) the revokability of a decision to be made if based on this evidence.[43] In turn, subjective probabilities are "very much influenced by age and experience"[44] operating through these factors.

If, after an event occurs (or does not) for which a person has posited some subjective probability, the person believes he posited wrongly, he can change his notions. Needless to say, such a change has a measure of importance only if the event occurs again; if not, changing one's subjective probability is as useful or useless as any other bit of hindsight.

Change in subjective probabilities during the decision making process is accomplished by means of search and feedback, a topic considered later in this paper. As to the certainty of values, there is a similar affirmation of their applicability (in an individual's mind) through experience in different situations. Thus, the comments which have been made about beliefs-facts also hold for values, although there is a special sort of truth being determined: one is subjectively more or less certain that a value is appropriate (rather than true) in his decision making context.

4) Certainty, Risk, and Uncertainty and Open and Closed Systems of Decision Making. If a choice must be made between, as an example, two specific courses of action, then three realms of decision making exist, corresponding to three states of knowledge

concerning actions.[45] There is first the realm of certainty, where each action is known to lead invariably to a specific outcome or set of events. (As Morris points out,[46] this is actually assumed certainty, under assumed complete information, which can never reach full certainty for it is based on inference or a conceptual simplification of reality.)

The second realm is that of risk, where each outcome leads to one of a set of possible specific outcomes, each outcome occurring with a "known" probability; the probabilities are assumed to be known to the decision maker. (In a sense, certainty is a degenerate case of risk where probabilities are 0 and 1.) Risk can be established by either subjective probability or other types of probability determination, the latter subjectively rooted in inference, but with its roots explained more fully and its manner of determination perhaps more replicable.

The third realm is that of uncertainty, where either action or both has as its consequences a set of possible specific outcomes, but the probabilities of these outcomes are completely unknown or are not even meaningful. (A rather special case of uncertainty is incorporated into the "theory of games" based on the work of Von Neumann and Morganstern, and not quite a complex field of study in itself. This case is the situation in which the outcomes of actions are certain in a given environment, but are rendered uncertain by the action being forced to take place in an environment of competition. This environment may be a malevolent Nature--giving rise to the phrase "games against Nature"--or some intelligent competing person or group of persons, presumed to be attempting to "do in" the decision maker or minimize his gains.)

A set of decision conditions exists, drawn from the preceding set of inputs, in which the decision maker is certain of the problem he faces and its parameters, the system within which he must act, the values he must espouse and the goals he would like to attain, the alternatives for action available to him, the rule he must use in deciding among alternatives, and the operation of his executed action--in short, he knows, and is certain of (or certain of the risk of) what he can do. Such a decision maker is operating in a closed system of decision making.[47] In contrast to this set of conditions is the situation where all is uncertain: the environment, alternative actions available, the ends to be sought, the impact of anticipated actions, the most appropriate decision rule to apply--in short, the decision maker is in a situation where his uncertainty is total, except for the requirement that he decide and act. Such a situation is an open system of decision making.

In the closed system, the environment can be changed by a decision; in the definition of the system, it is implicit that the nature of the change is known beforehand. In the open system, the environment can also be changed by a decision; the change, however, cannot by definition be ascertained beforehand.

Other results of an action may occur in either system. The decision maker's information about his environment may be affected or not by changes resulting from his decisions. In the two instances above, information would certainly accrue to the decision maker in the open system (if he had a mechanism for obtaining feedback from the environment), while it may or may not accrue to the decision maker in the closed system.

(Information would be defined, in these cases, as a finding that a difference exists between fact and prior expectation of that fact by the decision maker.)

Situations might exist in an open system where both the state of the environment and the state of information about it are unaffected by decisions. If, in addition, the environment appeared non-stationary at the outset, this situation would be analogous to the case of a man affected by forces beyond his control. In such a circumstance, if a man _must_ act (and it shall be assumed that, for whatever reason--curiosity, fear, or law, among others--he must), the "best" he can hope for is that he will obtain information and the outcome of his decision will not be detrimental to him. It is in a manner such as this that facts and values are revised, and used in changed form in subsequent decisions.

INDIVIDUAL DIFFERENCES AMONG DECISION MAKERS

To enunciate assumptions inherent in decision making does not say how these factors vary or remain the same from individual to individual. Implicit in the way they have been stated is the idea that men somehow are both similar and different. They have different types, levels, and breadth of experience; they interact to differing degrees with the environment, exhibit differing capabilities for dealing with their environment, and organize images of their experience in different ways, but all do these things. The problem in studying decision making to reconstruct its logic for the public is to know in what areas man is unique, and in what areas he is like other members of the public.

1) _Motivation_. People, as they interact with their environment, do what they find most likable. Decision makers do it, planners do it,

scientists and artists and housewives do it. The essential nature of this interaction is it is common and it is personal. The likeability of an act is bothersome, however, as a base for decision making. In a particularly sweeping and sophisticated work by Churchman dealing with the "philosophical issues of a science of values,"[48] the author (especially concerned with the contributions which science can make to introducing consistency to decision making) finds himself stumbling over reasons for the notion of ought. Realizing that decision makers are deeply involved in determining and implementing what ought to be (in their terms), Churchman says

> We therefore want a conception of science that enables the scientist to look at all the world. Recommendations are a part of the world, and hence we are driven to inquire how science can verify recommendations....the argument just posed is not rationally compelling. But its compulsion for the moment rests on the emotion of intellectual curiosity. If there is a sense in which one decision is better than another--a sense that is clear to the executive as he views the world--then how can the scientist go about verifying (or refuting) such a judgment?...The natural answer to this question is that there must be some way of putting all the facts together so that the judgment about the value of a decision can be scientifically proven.[49]

Churchman hangs his hopes for consistency of recommendations on science, and looks to a way of putting all the facts together which appears much like the notion of reconstructed logic. Yet Churchman himself moves back and forth from the world of logic to a world which has some non-logic within: a "compulsion" which "rests on...emotion." He justifies his concern about consistency by saying that consistency works as a rule governing science and its decision making, and if the rule were invalid there would be no science. But he neglects to observe that there would still be some of the world left--the world of "emotion," and the world where many decisions are made. This is not to disparage Churchman, for no doubt many of these thoughts crossed his mind often. It is simply to say that there is much besides logic on which to base a study of decision making, and it is foolish to assume that all is logical, or that all logics must be the same. The likeability of acts is one of those things which may not be logical. What "rational" decision making requires is that one must go as far as is technically or economically feasible with reasoned and explicit analysis, then appeal to judgment and personal experience--emotion, if need be--and not (for later justification) where the break between logic and non-logic came.

2) Aspiration Level. Aspiration level is a particularly important variable in decision making, for it determines to a great extent the nature of one's search pattern while at the same time indirectly determining the operation level of one's utility functions and criteria for choice. Aspiration level, or the strength of motivation to succeed in attaining some expected reward, acts by influencing the search process: if a person is highly motivated to succeed, he will engage in a high rate of search, and extensively comb through the potential alternative decision premises for satisfactory ones. On the other hand, if a person has a low aspiration level, he will most likely engage in a low level search process, or perhaps none at all, until some discrepancy between what exists in his environment, and his image of what ought to be, jars his aspiration level and motivates him to search for premises and initiate decision.

Aspiration level also influences a person's view of his environment. Edwards[50] reports on the work of Atkinson and Siegel, who are concerned with the content of aspiration: with motives to succeed or avoid failure and the relationship of these motives to determining subjective probabilities. Atkinson found that the relative strength of a motive to succeed, or to fail, influenced the subjective probability of a consequence which was consistent with that motive--it biased its determination upward. Siegel's notion of level of aspiration identifies that point on utility scales below which a decision maker does not go; he has some minimal level of utility for all consequences, corresponding to his aspiration to choose in some particular manner.

These studies, though few in number, begin to point to the integration between personality of the decision maker and the factors he admits as inputs to the decision making process. One would suspect the person who had a need to achieve, or a fear of failure, would pick actions (or assign probabilities and utilities to "benefit" certain acts) which are respectively more risky and more conservative. Such interaction is present to varying degrees in all decision making--indeed, it may be dictated by some role norm--and needs to be taken into account in reconstructing logic behind decisions.

3) Planning and Individual Differences. In the final analysis there are few statements which categorically can be made about how men are alike; it appears most likely that the one statement which can be made is that men differ. The fact that little more than this can be said has a strong implication for planning for more than one person, for these

differences must somehow be reconciled. It is important now merely to observe that no systematic tally of how men are alike exists; thus, each time the planner must concern himself with similarities, he must ascertain them afresh, or verify the reliability of old experiences.

Individual differences among planners influence their manipulation of the planning process, and hence can influence decision makers. The image which planners hold, or their perception of the context in which they must operate, can vary from person to person, in terms of things valued and facts perceived, regarding elements of the context or their interrelationships. Such variations are summed up in the planner's conception of his role, a topic of a later section of this paper, and his conception of the situation to which he must respond.

There can also be differences in the considerations which a planner gives to his other roles: to the mix of forces emanating from this potpourri which he allows to influence his action. There are also significant differences among clients which influence the actions of planners--especially in the decision of whether to consider such differences. The choosing of a mix of inputs according to role is consistent with ideas suggested by Herbert Simon; he notes that the influence of role, itself influenced by society or some partial social context, is upon decision _premises_.[51] Some, but not all, of these premises are specified by role. Hence, there is room for considerable individual difference. In fact, there is room for a choice between personal and organizational identification with decision premises, when a planner evaluates actions in terms of their consequences for himself or a specified organization or group.[52]

A model of the planning process must allow for this choice, to make a reasonable base for the practice and justification of planning.

INSTITUTIONAL CONTEXTS

Men do not perform all their acts alone, nor is all their experiencing done from a position outside the company of other men. The nature of the context often demands that more than one man must act if a particular event is to occur. Similarly, observation of the occurrence of an event is often a shared experience among many men, who later (either individually or as a group) attempt to come to terms with the meaning of the event. It is when man is not alone, either in his action or his experiencing, that he is a member of an institutional context--a context which makes him somehow reconcile his facts and values with other men around him.

As a definition, an institution is defined by a set of roles and role relationships, in terms of rights and obligations or responsibilities for its members in the conduct of activities in pursuit of specified general ends. Institutions such as corporations, churches, and government are well known; less well known, but contained in this circumscription of institutions as a context, are voluntary groups formed to seek some interest common to group members. All these institutions have in common, besides roles and role relationships, a set of rules for determining the meaning, significance, and relevance to their purposes of events in the world. These forces acting upon men produce (to varying degrees) internalized structures or norms for acting--an obligation to be met which men trade for the rights of institution membership. The nature of rights and obligations determines many of the premises to decision making.

1) Role and Responsibility in Decision Making in an Institutional Context. Each man acting conceives of himself implicitly or explicitly as an incumbent in one of his many roles--for example, as father, employee, administrator, church member, neighbor, American, participant in a democracy, or a member of Western culture. In each role, he has obligations: he shall be fair, kill, pray, raise children, pay taxes, work, or personally perform other acts in prescribed ways.

Action which man takes counter to his obligations must be justified in terms acceptable to the institution, or a decision maker runs the risk of sanctions imposed on him by other members of the institution. Just as each organization and role has a factor inherent in it setting the likelihood that illegitimate actions will be discovered and sanctions imposed, so each role has a sphere of relatively "free" action. Since it is seldom that norms can prescribe all actions to be taken, latitude exists in roles for each incumbent's taking action justified on grounds of his interpretation of the situation he confronts and the spirit of his role.

Among role norms, the ones crucial for this discussion are those that deal with planning: the scope of actions which are part of the obligations of a role, and the facts and values which are both a part of, and within the purview of, a role. In dealing with decision making, a norm exists (for each role) which defines when an event is to be dealt with or acted upon by a role incumbent: deciding is often sharply constrained by values to be fostered, ends to be sought, and legitimate means to be employed in creating, analyzing, and implementing solutions. It is therefore important in studying, and critiquing, decisions to separate role prescriptions and norms from more personal characteristics of the decision maker. Though responsibility is a potent force in decision making, it is often at odds with and weaker than personal values.

When a decision maker faces a conflict between what his personal norms dictate, and what his institutional role norms dictate, he must face squarely the obligation of responsibility. A man facing conflict of values is subject to potential capriciousness of behavior in decision making. Responsibility is the force which limits this capriciousness. Responsibility is circumscribed by that set of role obligations which indicate how a role incumbent must behave so as to be consistent with the values of those who define his role. (It is assumed that role-definers have more power than incumbents in setting out how a role shall be defined.) If an individual does not behave in conformity with his responsibilities, his actions can be negated (assuming some process of review of decisions exists), or his role may be given to some other individual to fill (with the assumption that the second individual will be more "responsible"), or the extreme individual can be held liable for social damage (to the institution or beyond it) which his irresponsibility may cause.

The role obligation concerning revokability of actions is a specialized case of responsibility. It is often important for decision makers dealing with changing systems or extremely scarce resources to take actions which will be subject to later adaptability, easy change, or termination or negation. Thus, revokability of an action is often part of those role obligations concerned with decision making. To link these thoughts to earlier concepts, role is a function of institutional contexts, and of the environment as a whole. Thus, role can be expected to vary with the nature of the environment, as some institutions are powerful over and others merciless in the face of their respective decision making contexts.

2) The Institutional Context of Planners. The planner about whom this report is written is a public planner. Thus, a major cluster of those forces which define his role in an institutional context are those forces for responsible public service. In addition, the planner in this report is (first) a practitioner of applied science, and (second) a scientific researcher (where uncertainty exists regarding the facts in the situation he faces). Thus, a second major cluster of forces defining the planner's role in an institutional context are forces for objective research and the appropriate use of research findings. Finally, of course, he has a set of personal beliefs about what he should be as a planner. Each of these forces forms a part of the planner's role, defining his responsibilities and granting him his rights. And each of the components of his role dictate to a great degree how he is to behave in decision making, if he aspires to fill his role properly.

Of those forces identified, five clusters appear to affect the planner most, as gauged by their mention (implicitly or explicitly) in the Code of Professional Conduct of the American Institute of Planners.[53] There is first a professional context, dictating that the planner shall in his endeavors be responsive to demands of the values of social consciousness and professional conduct. The latter requires that he be tolerant of other planners' activities, and attempt always to maintain and enhance the image of the profession. The former requires the planner to be attuned to others than himself--a commitment which causes the planner to carefully analyze the demands of a situation before acting on his own volition. These forces of professionalism motivate a planner to look to his professional peers for guidelines to form his image, but also require him to investigate society's demands in forming an image with his aid.

A second context is the public context, the role of public servant or private professional acting in response to a perception of the public interest. As a servant of the public (in either of these forms) the planner incurs the obligation of gauging or knowing what is the public interest. The manner in which this is done (methodology) as well as the framework used to investigate the questions of methodology (conceptualization) represent an especially tricky pair of problems for the planner to solve. Altshuler painstakingly points out that the planner is commonly viewed as having a part in the goal setting process of a client group, and urban planning often has the goal to serve of the common good. Yet Altshuler also finds, in his case studies, no vision of the good life (whatever it may be) among his planners investigated, and hence no empirical or intuitive notion of what interests the public, either in isolation or in relation to other group interests. Thus, the planner must discover, like any other man, the facts which he will act upon and the values he will serve--if he is to appear reasonable.[54]

A third contextual force is a context of technical prowess--the planner is not a rash artist, but a technician, or perhaps an engineer, or even a full-fledged scientist. In an effort to seem reasonable, and even to first become credible, the planner must appear to carry out his efforts in methodical fashion, and strive to advance the art, science, and practice of his proclaimed profession, through an exchange of his opinions and knowledge with others. (It is this force particularly which directs this report.)

A fourth force in the context is the planner's membership among utopians, or among optimists, or at the least among people whom the public expects to take visionary leadership. Such persons tend to believe things can be made better; they value goal-oriented action rather than reactive efforts, or when forced to react most highly value those efforts which seek to attain goals beyond those of solving immediate problems. Often their work inherently has a lack of feasibility; decisions which planners see as necessary often require, by design, a change from the status quo which is deemed impractical or unfeasible (though not necessarily unreasonable) by non-planners. These decisions are programmed by planners striving to increase the rate of action and change toward set goals--planners acting optimistically. The force to be intolerant in the face of the status quo is a potent force in planning, and strongly affects the decision making aid which planners give.

A fifth force in the institutional context is particular to planning in the United States. The planner is one of a number of advisors to clients; he aids in, but does not share authority for, the process of decision making. This is often true in urban planning, where the planning agency is a staff advisory agency rather than in a line position, or where the agency has line authority only on specific referrals of action to it. It is true that a form of responsibility exists to bind the actions of planners, but this responsibility is to other groups, usually peers, and is not accompanied by authority. In short, the planner-as-advisor can advise almost anything, subject only to internalized restraints.

While planners may try consciously to provide expert aid, there are no guidelines for action specific to the advisory role.

In summary, many influences operate on the planner as he proceeds through the planning process: public, technical, utopian, professional, and advisory. Each of these forces in the institutional context impinges upon the planner in specified ways: he must plumb the public interest, and act in accord with it; he must employ appropriate methodology and follow the scientific method; he must be goal-oriented and move toward an "improvement" of the status quo; he must respect his fellow planners and be cognizant of the impact of his actions upon society, as well as subscribing to a set of principles for action; and he must not make decisions for his clients. A model of the planning process used to justify a planner's actions must account for the interaction of all these forces with the planner's personal values, and result in a justifiable plan.

3) The Value of Change as an Input. Planning can produce acts which change or do not change the character of the environment. It is the value of change and no change working together, in a democratic context, which give the appearance of individual freedom or which produce large or incremental systemic change. Some acts may be freely taken so as to produce desired changes; others may not.

The value of change is an integral part of the task confronting decision makers, who must determine its role as an input to the process of deciding. It may be that a change is simply the decision to act; in this case, a value of change is to act when action is usually not taken. If one chooses to act, and applies decision making methods to implement his choice, he may restore equilibrium to the system in which he acts, or change the system, improving it or not according to the values he serves. Such change is of two sorts: one may restore equilibrium as it existed before (maintain the system), or one may strive to create some new (or no) equilibrium (develop the system).

Restoring equilibrium often appears to be no change at all (although the restoration may be carefully engineered), and tends to appeal to "conservative" points of view (using a specialized notion of conservative). On the other hand, creating a new equilibrium is often associated with a "liberal" point of view, for new values are being entered into the decision making process. Improvement, or a change in notions of equilibrium, is accompanied by a change in values of the participants of decision making by the creation of a new or changed point of view on what ought to be. The processes of restoring and improving are truely the same, however, for both are changes in fact. The value of change has to do with the degree of change deemed desirable in any given circumstance. In group and community decision making, of course, the value of change must be reconciled among the participants in deciding, and resolution of conflicting values must be achieved before the process of deciding can be completed.

What is implied in these thoughts is that the decision maker employs his values of change in setting of objectives, the determination of notions of feasibility, and the choice of final actions. The appropriateness and inclusion of values for maintenance or creation of a new equilibrium or for incremental or large change, must be considered in a reconstruction of the logic of the planning process.

4) Planning as a Value. The manner in which scarcity is dealt with in decision making is value-based, and the activity of planning is a

manifestation of that value. Men acting in a changing decision context can acquiesce to change or attempt to cope with or combat it. Each of these stances relative to changing scarcities is a value position; there is no evidence that tomorrow will be like today, and thus neither avoidance nor the taking of action can be justified on logical grounds. Planning for future action, or attempting to anticipate the future impact (direct and indirect, positive and negative) of actions taken in the present, is merely one way of reacting to scarcity: by trying to anticipate changes, and utilize them for one's ends.

In the same way, time horizons for planning, ways of discounting the benefits of future events and other concerns in planning which relate to the future, as well as the comprehensiveness of view taken toward impacts of actions, are all value-based. Granting this, however, it is still imperative to have a system for selecting among interpretations of these values if one wishes to have reason in his decision making. The choice to be concerned about the future or the scope of impacts can be value-based; the level of concern for these things, however, is part of the institutional context of planning, and can well vary from application to application of the planning process.

5) Issues and Their Role in Decision Making. The raising of an issue is the raising of a theme of wide concern in the institutional context. As Isler notes, "Important issues lie beneath the surface of nearly every governmental decision...a substantial number of underlying issues are dilemmas, in that they are incapable of resolution under any circumstances in the very short run....It is the comprehensive planner's job to see each decision in the light of broader issues. The benefits of

such analysis work in both directions....Having identified the issues, an additional means of anticipating decisions is obtained."[55]

At this point, the major components of an issue can be seen (by implication, for there is no commonly-accepted definition of an issue). As a theme of wide concern in the decision making context, an issue is the stating of a value which ought to be fostered, or the recognition of a dilemma between two values both of which are thought to be relevant to action. Recognition of an issue often is followed by the belief that a need exists requiring something be done; this, however, is not always the case. An issue is, simply, another value concern to be admitted to the process of decision making at the discretion of that person responsible for acting. A model of the planning process must, however, allow for the raising of issues. Isler continues, "To the extent that we can define, relate, and weigh the issues, a valuable analytic framework can be provided for assigning priorities to key decision areas."[56] In other words, the emergence of issues delineates a problem area within which decisions most likely will have to be made.

Aaron Wildavsky implies that the study of decision making would gain by making explicit and systematic some analytic category for the context of issues, specifying the situations in which issues occur and their impact on the decision maker.[57] He observes that different issue contexts invoke different decision making patterns (strategies) which affect the manner in which a decision maker goes about trying to solve a problem. Thus, issue contexts influence the result of the decision making process. While intensive discussion may surround issues, they usually are of such a general nature that nothing can be done to resolve them. Rather, further problem solving processes must be engaged in, to solve particular components of problems which have generated an issue.

6) Conflict and Power. If men and institutions of men differ, it is quite conceivable that conflict can arise. If one man insists that X fact or Y value is the case, and a second man insists that X' or Y' is more truly the case, a basis for contention of the truth of each statement has arisen. In such a circumstance, either one man must relinquish his view to that of the other, or conflict of some sort will exist. In a similar fashion, one man in a group of men may differ with all other group members, or with some particular members, on specific points. In addition, a man may believe that what he sees to be relevant facts or value in a particular situation are at odds with, or at least different from what his employer, his corporation, his church, or his government would believe to be relevant (assuming for the moment that these latter entities have a single view of what is relevant).

Men come in conflict, and yet each man is not in conflict at all times. Thus, some mechanism must exist to mediate or resolve conflict. This mechanism is power or influence--the capability of one entity to lessen the opportunity for survival (in several senses) of another entity. Survival can be threatened in several senses, depending on the values of the individual man being threatened. Men acting in a way which they do not value, or acting in a way which they value but having no effect from any of their work, or finally acting in a way which they do not value and having no effect on the environment, find the meaning of their lives questioned and, thus, are threatened. Any force which results in diminishing the meaning or existence of life is a threat. Thus, conflict about facts or value, since such conflict results in questioning the meaning of life, is threatening to those involved; the mechanism for resolving this conflict is power.

Two major modes of power or influence exist; they are exemplified by brute, animal power within the individual (biologically determined), and such modes as chastisement, slander, and ridicule (socially determined). Power is itself a component of the context. Within the context, different modes of power have different effects on different individuals; this notion follows logically from the earlier assumptions about individual differences. However, the end result of any use of power is that conflict is resolved to some extent. The ultimate extent of conflict resolution has been reached when one party to the conflict (or all other parties) no longer exists.

In a series of similar and particular situations, where one has specified the issues of the conflict and the identities, capabilities, and positions of combatants on the issues at hand, it is possible to theorize that the more powerful combatant tends to overcome the weaker, until over time only the more powerful remain (in terms of that conflict only). (Such an evolution of the more powerful has many parallels, but it should be noted that it is not the same as Darwin's evolutionary theory. A point often overlooked is that Darwin's theory had to do only with the ability to survive to reproduce additional members of the species; the theory says nothing about other facets of the evolutionary process.) However, it is commonly observed that the "goodness" of a person's position concerning either facts or values is unrelated to power; there is no correlation between virtue and reward, and between "goodness" and power. In a very special sense, there is a correlation between power and "goodness": over a series of conflicts in any specific context, the positions of the powerful on issues tend to become the positions held by most men, as opponents to these positions are eliminated. Similarly, those issues where diversity of position occurs can often be seen not to be important to those men with power. However, since individuals come and go, and each individual differs, the context gradually shifts; as the context shifts, that which is the base of power shifts; as power shifts, the nature of values changes. A model of the planning process should allow for shifts in the mode of conflict resolution and the possible resulting changes in decision premises in varying institutional contexts.

7) Scarcity as the Precondition of Choice. One of the devices in literature used most often to portray man's life is the dilemma--the choice. The meaning of a dilemma--its discomfort, often its pain, certainly its unlikability--is an intensely private thing. Yet the privacy is such it appears that all people know it. There must, then, be some common experience which brings all people to a dilemma. That common experience is scarcity.

Scarcity is the experience of not being able to do all that is likable at the same time. It is linked to man's image of his context, but goes beyond it and is a part of the context; it is part of the man in context. Scarcity is meaningful in differing degrees to people and institutions with different conceptions of self-interest. It derives from the non-frequent existence or non-existence of something found likable in the context of man's action. It is represented by man's inability to act (when he would like to) and not act (when he would like to) at the same time. It is true, as one might suggest, that some men execute some part of two or more acts at the same time, and others find they are able to do two or more specific acts at the same time. However, this fact shows only the specificity of scarcity to context. It is a fact that all men have an ultimate scarcity--their own lives.

Scarcity has high situational relativity. For example, food may be infrequently found (relative to a man's liking--a liking shared by all men) in a particular nation, and be labeled "scarce." At an earlier time, when more food or fewer men were present (granting still that all men find food likable), "scarcity" of food may not have been present. Some other entity, such as a walrus in a cornfield, may be non-frequent, but considered a scarcity by only a few people--say those who enjoy a meal of cornfed walrus. An implied relation exists here between personal experience, actual context, and values. If a person or institution has not had experience with a thing (except as he can abstract from earlier and believed-similar experiences), he cannot react to notions of its scarcity. If a man asks me whether I am concerned about the infrequent sighting of a gronx in the area, I cannot honestly answer, for I've not had the experience of knowing a gronx. However, man can attach some value to his life, for while he has not himself experienced non-life, he can conceive of the inevitability and nature of the passage into it. Churchman has said that "...probability of outcome [that is, existence in a subjective sense] will be a necessary condition for ascertaining a person's values."[58] It is experience which allows the determination of this subjective probability (a notion that was discussed previously). It is, finally, experience, probability, and the ensuing creation of value which allow for the determination of scarcity; it is the interplay of these factors which serve as the precondition for all choice.

SUMMARY

Models of decision making and planning must be capable of dealing with a number of contexts and inputs to the process of planning. To contend with the factors here discussed, models must be available to cope with certain and uncertain facts, certain and vague values, and the resulting concreteness or ambiguity of image and observed system. Models must also provide flexibility for accommodating differences among individuals in motivation and aspiration level, and in image. The models to be useful in planning need to be especially responsive to demands of the institutional context of planners--to their role obligations and responsibilities to other government decision makers. The question to be asked at this juncture is: to what degree are existing models and theoretical constructs in decision theory capable of meeting these needs?

CHAPTER THREE: DECISION MODELS AND THE DECISION PROCESS IN PLANNING

INTRODUCTION: STEP-BY-STEP PRODUCTION OF DECISIONS

All of the studies made of decision making surveyed have one characteristic in common: they are not simple, unitary events, but are the product of a complex psycho-social process generally extending over a considerable period of time.[59] The production of a decision can be viewed as a step-by-step process whether individually or collectively undertaken. Each step utilizes some or all of the previously identified inputs to varying degrees, and it is this process of utilization which is now the focus of our attention.

The notion suggested by Simon that a decision is like a conclusion derived from a set of premises[60] will serve as a useful model for analyzing the process of decision making. It is imperative to remember, however, that the brand of logic employed in decision making is decided upon by the decision maker, and subject to his (or their) revision at will. The concept of a process has as its essence a set of steps or operations to be performed, and some order to the process. Simon's three steps to the decision making process, though simple, are basic, descriptive and comprehensive: the steps are intelligence, design, and choice; or again, in his words, finding occasion for making a decision, finding possible courses of action, and choosing among courses of action.

To this list ought to be added a fourth step, the step of taking action, or implementing a decision. The reason for this step is partly heuristic: it allows us to come full circle in conceptualization, to taking an action on the environment which possibly will change it. In addition, however, this step serves to remove much of whatever is capricious in the decision making process, for it adds the test of "stern reality" mentioned as part of the context of decision making. The decision is indeed a new "fact," and its correctness can be verified by adding implementation to the process of decision making.

The basic framework of the decision and planning process, then, is intelligence, design, choice, and action. These four phases of activity will be used to describe models of the decision process, then will be expanded to encompass other considerations in decision making behavior, to outline the ideas which must be a part of any reconstruction of the planning process.

STRATEGY AND METHOD: INFLUENCE AND LOGIC IN DECISION MAKING

Before discussing the decision making process in detail, a distinction ought to be made between strategy and method in decision making. Method is that step-by-step movement through the intelligence-design-choice-action phases of decision making. The strategy of decision making, on the other hand, is the employment of a decision maker's influence and the outputs of his method of decision making so as to achieve use of his product.

Strategy is concerned with whether and how the decision maker acts. Strategy in decision making may be simply the move to use or not to use the decision making process in dealing with a particular problem. Influence may be wielded over individuals by the decision maker by varying th length of time required to carry out a step in the decision making process. For example, the decision maker may extend a step over time to give an appearance of doing something, or may rush through a step giving only superficial treatment to the information to be considered there. In a similar fashion, the decision maker may vary the scope of facts or the depth of analysis which he would customarily admit to the decision making process. In addition, he may vary the participants or vary the degree to which he employed each participant's contribution to the process. Finally, by delineation of alternatives and choice of a final action, he may influence which parts of the institutional context will provide means to act in any given way. Taylor illustrates how strategy must be considered at the same time that decision making processes are being planned. He indicates the channels by which research (or the output of steps of decision making) may enter the legislative process; these channels are both formal and informal. Taylor identifies three of the many channels: informing a special committee or commission involved in investigation of a broad problem; creating a hearing on a particular bill or issue; and use of the ear of a "sympathetic legislator."[61] Social scientists can contribute much to decision making in an attempt to make it more intelligent and rational; however, before they can make use of their potential power, social scientists must come to grips with the processes of decision, in order to understand the rules of that game (and especially the rule of timely action). It is necessary to find both formal and informal, personal and official, ways to make the best use of information gathering, analysis, and reporting processes. Only through influence--through strategy--can the data gathered in research be employed to clarify issues and to raise intelligent courses of action in the arena of practical (public and office) politics where decisions are made. What is of concern in this report is method; variations in strategy may be very helpful to any decision maker, but unless he employs them in reconstructing his logic of problem solution, their investigation is not the primary topic of concern here.

A LOOK AT EXTANT MODELS OF DECISION MAKING BEHAVIOR

In order to determine if a model exists for describing the context and inputs of planning as a mode of behavior, and is capable of meeting the criteria for a usable conceptual framework for viewing planning, it is necessary to discuss and evaluate the available models of decision making behavior. The following five models appear to encompass all the diverse types of models discussed in the literature on decision theory; while they are summarized here, an attempt has been made to be fair to the ideas of their original authors.

1) The Satisficing Model. The satisficing model of decision making behavior[62] has been created to describe man's actions during those times when he cannot determine which one among a set of alternative courses of action is optimal, due to his inability to specify the costs and payoffs of those actions. More is involved than a set of intangible, immeasureable entities; in the satisficing mode, costs and payoffs are not known. (If one knew the payoffs and costs of alternatives, he could begin to use a rational model under conditions of risk and approximate more systematic and reasonable goal-oriented behavior.) The satisficing model requires that a man search for a set of possible outcomes that are satisfactory in terms of payoffs he desires. The model then requires that the decision maker scrutinize each alternative action carefully and search for a more precise statement of its outcomes. (Both consequences and payoffs are,

or may be, related to previously-chosen alternatives; in addition, consequences may change the nature of one's notions of payoff utility, for experience with different outcomes increases the ability to compare. Thus, in experiencing payoffs, part of the payoff in the outcome is information gathered--a key concept of the learning model of behavior.)

Alternatives are chosen or searched for on the basis of their having properties of outcome deemed satisfactory. One of the problems in decision making to which the satisficing model addresses itself is the sequential presentation of alternatives. Oftentimes in the design of courses of action, designs are introduced into the decision making process one at a time. In other instances, the production of designs is uncertain (an example is the bid of one man on another's property--the arrival time of the next potential buyer is often unknown). The satisficing model directsthe decision maker with an imcomplete set of all possible alternatives, or incomplete knowledge about alternatives, to analyze and choose among them using a simplified payoff function and a considerable degree of judgment.

The decision maker is directed to choose the first alternative which presents an outcome which exceeds the level set as satisfactory. Thus, the payoff function is composed of win and lose; of satisfactory and unsatisfactory and indifferent; or of some similar simple function. When the value of variables entering the analysis must be judged, the decision maker has only to find that value for which the choice shifts from one alternative outcome to another. His judgment must only be whether a value is above or below that critical, satisfactory point. Using such a decision rule, the decision maker can be certain he cannot make a better choice, for his choice has only to satisfy a linear inequality, rather than maximizing some function. If partial ordering of payoffs is possible, for a case where one action results in several outcomes, vectors can be used to create (for n vectors) an n-space within which satisfactory outcomes can be chosen as in the simplified case. If a group of decision makers is involved, and some system of aggregating payoffs can be found, one vector can be used to represent all outcomes for one alternative.

Dynamics are present within the model: as satisfactory alternatives become easy (over time) to find, the decision maker's aspiration level increases, and his satisfaction in that situation is likely also to increase as successive approximations yield a "near-unique" solution. Conversely, as satisfactory alternatives become hard to find, the decision maker searches to find more alternative actions. Hence, aspiration level at some time t is a function of the decision maker's previous history of successes, and this level of aspiration sets the threshold of his simplified payoff function.

In terms of the criteria which a conceptualization of the planning process must meet, the satisficing model falls short of providing an adequate model for the process. Relative to the normative-descriptive criterion, the model is normative and descriptive for uncertain data, but leaves the decision maker unaware of what he ought to do when he has more complete information, or has several alternatives available at the same time. The model does, however, provide a link to other forms of planning or decision making for shorter periods of time. The model appears not to depend on any particular political ideology or set of values; hence, it appears both technically and politically value-neutral.

In addition, the model appears to meet the criterion of factual verification, within the confines of uncertain information systems. No measure of rationality is provided by the model, although it does incorporate a number of non-rational processes such as judgment and intuition. A sort of closure is reached by the model, although it does not provide for feedback or operations on the environment; it does, however, accommodate notion of a process of planning, but does not do so explicitly. In terms of participatory inclusiveness, there is no mechanism for mediating between conflicting decision premises; all conflicts are assumed to be resolved _a priori_. Finally, there is no consideration of information cost by the model, although there is a mechanism for searching and changing the rate of search. In summary, the model appears productive (thus meeting the final criterion) of hypotheses about planning behavior, but does not meet many of the crucial needs of a planning model.

2) _The Learning Model_. The learning model[63] is built upon a basic framework of feedback loops in the rational model of decision making. If one visualizes a major series of steps (or a cycle) of intelligence-design-choice, or problem awareness--doing something with information--choice, it is possible to see that each step sometimes requires more information than what is readily available. In such a case, a sub-cycle of decision making and feedback occurs. For example, within problem awareness, there may be the awareness of a need for new information, followed by a process of doing something with information, followed by choice of the premise in which to place the information. Within this information processing step of this sub-cycle, there may be yet another cycle of decision making dealing with the gathering and manipulating of a different sort of

information. However, the lack of time pressures one into making decisions (in any of these cycles) with something less than desired levels of information. The basic problem to which the learning model addresses itself is the problem of knowing when to stop gathering information and choose a premise to enable the decision maker to move to the next step. To overcome this problem, a great deal must be known about the information yet to be collected, and its likely role in the process of deciding. The dynamics of the model are as follows: after each increment (bit) of information is obtained, the decision maker must compare the cost of stopping and deciding with the specified cost of continuing to gather information. The cost of continuing must be based upon the assumption that it is likely with each additional increment of information one would make the same decision he would have previously made. In other words, one must compare his best present choices with the expectation of his continuing to gather information and making the same choice. If no more information can be gathered, one has no alternative but to choose the best action at that point--the principal reason for postponing choice is to gather information. (This model does not incorporate considerations of strategy in its computation of the cost of information gathering.)

The task of the decision maker is to raise alternatives from the realm of uncertainty to the realm of risk. The mechanism for doing this is based on Bayes' Theorem. In generalized form, a statement of this theorem would indicate, for some hypothesized outcome H, that the probability that H would occur given some evidence E (some theory, for example) is directly related to the probability that E would be explained given that H was true; directly related to the prior probability that

H was true; and inversely related to the probability that E would have occurred without regard to H. Using some form of this theorem, it is possible that the decision maker can transform his uncertain information into subjectively risky information.

Several rules then are avilable for dealing with choices under risk. If it proves difficult to handle information, the decision maker may simplify the complexity of costs of information (using dollar values for information cost), may suppress risk (choosing only a most probable future with which to work), or may generate some approximate utility function (set aspiration levels which enable the decision maker to satisfice). As the pressure of time closes upon the decision maker, he is often forced to lower his level of aspiration, and select more costly and less beneficial information, or choose in a state of uncertainty.

In terms of the criteria for a conceptualization of the planning process, the learning model appears to be a bit more adequate than the satisficing model for analyzing planning behavior. The model can serve both as a normative and as a descriptive model, and is adaptable to certain and less than certain information systems. However, the model does not clearly give guidance to decision rules which might be chosen, nor does it explain dynamics of change in aspiration level. The model is only partly accommodative and explanatory. It can accommodate a range of purposes of planning and illustrate a number of forms the process can take; however, the model does not forge a link between planning and other forms of decision making behavior (although such a link is possible). The learning model appears value-neutral, except that it does opt for use of the most beneficial information for deciding. (No particular political ideology appears to be part of the model.) Factual verification appears to be possible, given the state of the model. No explicit measure of rationality is given in the model. Closure is not present in the model; it does not describe all the steps in the planning process, but rather mainly describes the dynamics of information gathering--the basic framework of the model is extremely stable. There appears to be a great potential for productivity of the model; a number of hypotheses about the treatment of information may be generated. Participatory inclusiveness is absent in the model as it is in the satisficing model; there exists no means of resolving conflict concerning inputs. Information costs are considered in the model, and may be used to form a strong justification for planning activities. In summary, the model has several very strong points, but is generally only suggestive of a conceptualization of the entire planning process.

3) The Noneconomic Model. The noneconomic model[64] is designed to serve decision makers in those situations where no fixed predetermined goals exist (or where existing goals act as limits or constraints rather than ends for goal-directed behavior). The model is designed for instances where culture conflict or personal disorganization is likely prior to and regardless of the solution being offered, and where economic goods--scarce resources--must be allocated without calculating marginal costs and benefits accruing from the resources. No fixed number of alternatives are available from which to choose. Rather, design in the noneconomic model is seen as a process of continually investing time and inventing a definite course of action out of indefinite (and perhaps infinite) possibilities. As means are invested and tested against the

decision maker's perception of the situation, there is a mutual adjustment of means and ends until the choice problem is resolved. The task is to establish some order of actions for change, and within this order to determine which factors are to be adjusted to which.

The first step in the sequential process of noneconomic decision making is to make a preliminary factual survey of the possibilities of change. Possibilities for change are seen as a function of the introducability and acceptability of an action relative to a target system or group. An area is then picked in which to start a solution--although this is a highly dynamic process, relying heavily on feedback from various tryouts of courses of action. The area is investigated prior to beginning a solution. A problem area is selected that is independent enough from its context to sustain a separate solution against outside pressures, and solutions are begun in such a way that later expansion is possible. The easiest possible relevant change is then selected for introduction to the system. Solutions and conceptualizations of the problem change as new possibilities for change, new problematic factors, and new connections previously thought irrelevant emerge from the intelligence process. The model does not give any guidelines for information-gathering; rather, it is indicated simply that the use of the previously-stated principles requires a great deal of intuition. Measures of correctness of solutions (since no optimal solution can be attained) include reconciliation or harmonization of previous conflicting factors; an increase of toleration (the ability of the system to keep incompatible things separate); achievement of system equilibrium; and the incorporating of unchangeable or threatening forces in the problem area into a solution to achieve integration and growth of the system.

In terms of criteria for a conceptualization of the planning process, the noneconomic model appears to be a weak base for creating a generalizable model, although it does have several very strong points to offer a composite model. It is more normative than descriptive, and is designed specifically for dealing with the noneconomic aspects of decision making. Yet the norms presented have in them practically no mention of scope--of comprehensiveness, nor of considering specified components of systems to be dealt with. The model is not explanatory, or accommodative except in a limited sense; it deals with those situations where planning must deal with personal and cultural disorganization. The model is decidedly not value-neutral; it espouses only particular types of change to be undertaken, and only certain problem systems as appropriate to serve as a basis of action. Because of the lack of descriptive theory in the model, there is little base for factual verification. A sort of measure of rationality is suggested by the principles of a correct decision, although analysis of rationality must be highly judgmental. Closure is a key feature of the model; its use of feedback and the adjustment of ends to means makes the model capable of exemplifying the process of planning and decision making. Productivity of the model is rather low; it deals with a small (albeit important) portion of all decision making situations. Whether the productivity is lower than other models, however, is difficult to determine. No provision is made for participation of various persons or the resolution of conflicts in premises. Finally, information cost is of no concern in this model; rather, a continually recycling information gathering process is built into the model without regard for the quality of information generated. In summary, the model provides cues to the components of a conceptualization necessary for specialized decision making, but remains inadequate as the basis of a general model.

4) The Rational or Synoptic Model. The model most often discussed as representing the decision making process is the rational or synoptic model.[65] It has a number of distinctive characteristics and assumptions when compared to other conceptions of the process, as well as certain limitations when viewed in context. The model is seldom given a label, but when it is labeled is most often referred to as "normative," as opposed to "behavioral." The label is attached to indicate that the model is intended to serve as a procedural end to strive for, rather than as a representation of how men actually behave. However, the label is so seldom attached that the model bears investigation as a behavioral model.

The model requires that a decision maker specify all ppssible future states of affairs. This specification might be done by recognizing the existence of a particular problem and classifying it in accord with some criteria, then analyzing the situation (to identify the conditions which characterize the situation and the available opportunities for action which the decision maker is not precluded from taking). Following this, possible ends are reduced and elaborated (an end is considered to be an image of a situation which is the goal of activity). The model requires a single set of inputs to each step of decision making; hence, conflicting inputs must be resolved before the process can continue. Whether group or individual decision making is undertaken is without consequence for the model; it requires that all facts and values (concerning end states, and so forth) be reduced to one set for analysis by the decision maker. For each possible future state, a payoff function representing the utility of that state must be constructed. Information as to the likelihood of occurrence of future states must then be produced; the decision maker must predict the future states which will occur, or set the probability that a future state will occur. Given a particular set of future states with varying utilities and likelihoods of occurrence, the task of the decision maker is to design courses of action which will alleviate his problem or attain his desired ends.

Search for alternative solutions or courses of action then must be undertaken; such alternative may be found or designed. There are many possible levels of action--among them policy or developmental, program, or operational or project. For each end state, the rational model requires that a total set of alternative actions be specified which will attain that end. For each alternative, the decision maker must specify the exact nature of outcomes expected, and the probabilities of their occurrence. After alternatives are specified, specific payoffs are attached to them (either unique payoffs or a range of payoffs), and the alternatives are ordered in a scalar payoff function. This function is created by the comparative evaluation of consequences (anticipated and sought and unsought) in terms of those end states which have relevance for the decision maker. All alternatives are examined and assigned payoffs prior to the making of a choice of actions.

The alternatives are then evaluated by applying some mechanism of choice, to produce a justifiable chain of means to attain the ends sought. Judgment may be applied in several classical ways to make a choice of one solution from among the many available. Under certainty of outcomes, one may act to maximize his expected payoff. The decision maker may also act so as to maximize the product of utility and probability of occurrence of outcomes. In a situation when conservatism is required, one may act so as to minimize his maximum regret. Following choice of an action, the decision maker must act and implement his choice, and evaluate the consequences of his action on the environment to determine if additional action is necessary (that is, to see if he was correct in assuming certainty of knowledge).

The key concept of the rational model--indeed, the major assumption it requires a decision maker to make--is that the decision maker can specify with certainty all premises to be considered, all possible end states, and all alternative courses of action which can be mounted in seeking to achieve a given goal.

In terms of the specified criteria for conceptualization, the rational model appears less than adequate as a base for a general model of the planning process. The model is considerably more normative than descriptive, yet provides few reasonable guidelines for producing actions when only uncertain information is at hand, or when information cannot be gathered or analyzed. The model does accommodate a range of purposes of planning, and appears universal in its application, but such comments must hold only for normative usefulness within the constraints outlined here. (In actuality, much of the work with other types of models has resulted from the lack of explanatory power within this model.) Technically, the model is not value-neutral; it demands a highly organized, systematically treated analysis of ends and means of attaining them, together with a thorough analysis of the consequences of actions. A degree of factual verification of the model is possible given the limited state of its descriptive theory (or the lack of distinction between normative and descriptive theory). Rationality is not specified in the model; implicitly, rationality is the maximizing of one's subjectively expected utility, but the model does not treat the cases where such a quantity cannot be specified. Closure is not a distinctive feature of the model. The rational model is productive only in a limited sense; it deals with only those instances where information is certain or risky. Participatory inclusiveness is not a component of the rational model, for no mechanism is available for resolving conflicts among competing premises. Information cost is not considered at all in the model; it directs the decision maker to gather all information pertaining to ends and means without regard to the benefit which would accrue to an analysis from each additional bit of data. In summary, the model is less than adequate as a conceptual base for planning, although its components have been retained in many of the later models discussed.

5) The Disjointed Incremental Model. Responding to the needs of policy analysis in actual democratic American decision making contexts, Braybrooke and Lindblom have created a model of decision making which is oriented toward making relatively small changes in the social system through programs of action which make successive approximations toward some (undefined) goal.[66] The model they espouse is not comprehensive in viewpoint, nor does it purport to produce optimal solutions. Rather, its actions are exploratory, with a continual adjustment of means to ends,

and fragmentary, in that the alternative courses of action considered are but a few of the many possible solutions--and those alternatives are chosen to create the least disruptive change. As Bolan has summarized the position of Braybrooke and Lindblom:

> The planner would not attempt comprehensiveness (since he is unable to achieve it), but would rather work with segmental and incremental policy problems as these problems arise. His analysis would always be partial, focusing on the particular aspects of the problem at hand without placing too much stock in vague, hard-to-measure externalities or spill-over effects. He would recognize that any actions or programs stemming from his analysis would be experimental and the problem at issue would be successively attacked over time so that his current concern should be less toward ultimate solutions and more toward immediate (albeit partial) remedies. He would not attempt to define or articulate goals which his community should be moving toward, but would rather describe the ills currently present in the community and how they might be remedied. As a corollary, he would not attempt to devise means of achieving particular ends but would instead select ends appropriate to available (or possibly available) means. He would not attempt to analyze or even identify all possible alternative solutions to a problem (since he probably could not do this in any event) nor would he be much concerned with "system" effects which might arise from particular decisions. Finally, he would recognize that many other decision centers are concerned with the same issue and will be preparing their own analysis. The planner, therefore, would focus on the particular areas in which he has particular expertise.[67]

The incremental model meets most of the criteria for a conceptualization of the planning process, yet it falls short in several areas in providing a base for a general model. The model is both normative and descriptive; indeed, it is based on a description of how policy analysis is actually undertaken in certain contexts in the United States. However, the model is normative and descriptive only for the type of change which its authors describe as incremental; the model does not apply to changes or actions which are not incremental, and planners must consider the benefits which can flow from such changes prior to dropping them from consideration because of their seeming lack of feasibility. The model is not value-neutral; it directs the decision maker to consider only certain components of means and ends in depth, without reference to the effects on persons of actions which are hard to measure--although the hard-to-measure effects often cause the greatest concern in decision making. The model is accommodative and explanatory within the setting its description is based upon; however, it is fair to point out that as a representative setting the conservative one does not encompass all the settings of public decision making. As the model is descriptive, so it is capable of factual verification. Rationality is not explicit in the model; it appears to be a highly situational thing, varying with considerations of what is the important increment to deal with. The model appears to have a considerable degree of closure, for the decision maker is instructed to view each act as experimentally influencing the environment, and directed to evaluate its impact and the creating of new problems. Productivity in the model appears high, due to its base in factual reporting of the setting of incremental politics. The model does not include a range of participants except at the discretion of the decision maker; there is no mechanism for indicating which participants are legitimate, or for resolving conflicts. Information cost is considered in the model, but in a limited way: the cost of gathering information is assumed to be high, and so the analysis is limited prior to its beginning. No calculation of the costs and benefits of information is admitted to the model and thus its use is limited to a specific methodological setting. In summary, the model is a useful one for the setting and values which it considers; however, the model suffers as a base for a conceptual framework, for it cannot be used in those situations where non-incremental change and searching and analysis are appropriate.

6) Summary. Of the models surveyed, none provide a completely adequate model or conceptual framework for the analysis of planning behavior. There are a number of disadvantages in each of the existing models which prevent them from being completely useful in the planning context, using planning inputs. To use any one of them is to omit from consideration a potentially useful and significant part of the logic of planning.

The satisficing model is usable only where facts are certain or at least expressed as risks, and where most values are either certain or risky (some may be uncertain). What constrains this model most are its assumptions concerning a simplified process of generating alternatives--one presented at a time--and the indeterminable likelihood that one is greatly sub-optimizing. A mechanism is needed in public planning for determining if other alternatives are easily obtained which might be more satisfactory.

The noneconomic model is much like the satisficing model in its shortcomings. Though it does accept many alternatives, this model makes certain very limited assumptions about responsibility--the "problem" is stated to be that which is capable of resolution, without regard to who or what is involved--and the value of change (or one's aspirations regarding it)--only the easiest possible relevant change is sought. So seldom, it would seem, is a situation so "noneconomic"--so value-uncertain--that this model is quite unusable.

The rational model is usable only when all of both facts and values are either certain or risky. In addition, it assumes one's aspiration level is overly high, so that he will continue the analysis of any problem until it can be stated in certain or risky terms. Such conditions can be met in only a few, usually limited, situations.

The incremental model admits the same kind of information as do the first two models--preferably certain or risky, but operable with uncertain values chosen by the analyst. However, it makes certain limiting assumptions about the role of the analyst--he has extremely limited responsibility, for only "disjointed" analysis, focusing on what he perceives are the important points--and his aspiration to broaden that analysis--and he assumes that other analysts will work for all other concerned interests. In addition, the model is designed only for situations where incremental change ought to be sought (ostensibly for reasons of some sort of feasibility). The upshot of these assumptions is a self-serving analyst dealing with only some of the likely relevant issues from only one viewpoint, and espousing only incremental solutions (for these are the only ones investigated). Such a model has utility in a very limited sphere--the sphere of within-agency operations.

The learning model is designed for those situations where either or both facts or values are uncertain. While it describes a useful dynamic, it says little about what to do with information once it has been generated and quantified with some degree of certainty.

In conclusion, what must be done is to create a detailed model which can provide that conceptual framework needed, by amalgamating the context of planning, its important inputs, and the valid components of extant models with recent findings from behavioral science research. That is the task which is attempted in the following section of this report.

CHAPTER FOUR: A CONCEPTUALIZATION OF THE DETAILED PROCESS OF DECISION MAKING AND PLANNING

THE DETAILED PROCESS OF DECISION MAKING AND PLANNING

Extant models of the decision making process provide a way of structuring the process so that more detailed consideration of decision theory can be introduced to begin to reconstruct the logic of the making of planning decisions. The beginnings of a conceptual framework, based on the context, inputs, and extant models of planning and decision making, are suggested in the following sections, as a basis for discussing recurring problems in urban planning.

1) Introduction. In the following sections, a conceptual framework for organizing and analyzing planning behavior has been created, and steps in the planning process are organized in a generalized sequential order of the processing of information for making planning decisions. Steps in the process (or categories in the framework) are designed so as to represent different types of information handling. Steps represent the gathering and organizing, and analyzing and reporting, of planning information. These steps were chosen to highlight, respectively, the descriptive and inferential processes in the planning endeavor, believed to be the two essential intellectual acts prior to choice in the decision making processes.

There appears to be considerable agreement on the more detailed steps in decision making within the framework of intelligence, design, and choice (as these steps were uncovered from the models previously discussed). The various models all acknowledge these steps as indicative of the essential components of the process. The steps, in a commonly-accepted order, are:

1) perception of a dysfunction;
2) conceptualization of the system of interest;
3) delineation of contextual values to be served by any action;
4) assessing the divergence between observed and expected systems;
5) identifying needs in the setting being viewed;
6) identifying problems generating needs;
7) stating the objectives to be attained in relation to problems, needs, and contextual values;
8) design of alternatives to solve the problem (including determination of the opportunity area for action and creation of alternative actions to attain the objectives set);
9) statement of the criteria which the chosen actions must meet;
10) creation of a relation which produces ordering of the alternatives;
11) analysis of the actions in terms of the criteria specified;
12) choice of an action by means of a decision rule; and
13) implementation and evaluation of an action.

(Although this evaluation can be done either formally or informally, such a step links the actions taken by choice to the environment of the decision maker, recycling the process of decision making.) The series of steps can be visualized as a circle, with new or additional decision makers entering the process or leaving it, either at will or in accord with their institutional roles. In a similar fashion, each step in the process also represents a process of decision making: a decision must be made about the nature of each step (for example, the exact specification of the problem must be chosen from alternative conceptions of the problem). In this sub-circle, decision makers may also enter or leave the process, as might be the case where many experts each contributed their perceptions of different components of a particularly complex problem or decision premise.

Within each step of the conceptual framework, the type of information handled is discussed, and the operations explained which are performed on decision premises. Several dynamics should be pointed out, although their discussion in depth will not come until later in this paper. These dynamic components of the conceptualization include the processes of search, conflict resolution, and feedback and the adjustment of ends to means. At each step in the decision process, information is needed to complete the step. If the information is too uncertain, or not available, search is begun to obtain more information. If an optimal level of information quality or even rate of search cannot be computed, then a satisfactory level must be reached for the decision making process to continue. (Or, as Herbert Simon puts the concept, when a single, uniquely-determined "best" course of action cannot be determined, "men satisfice because they have not the wits to maximize.")[68] If an acceptable solution cannot be found which will satisfy all participants to decision making, a process of conflict resolution must be introduced to enable responsible decision makers to proceed with their task. Finally, as decision makers proceed with their task, they often find unanticipated consequences force them to trace again their steps, often to the point of beginning intelligence tasks anew. Such an adjustment of ends to means also has within it a search and a conflict resolution phase.

The conceptualization, then, is based upon a set of steps with dynamic processes interrelating them, adjustable to the context, the issues, the information, and the participants which structure the planning situation. The purpose of the conceptualization is to point out, in more detail, considerations of decision theory which planners must use in reconstructing their logic for public view.

2) Perception of a Dysfunction. A dysfunction in one's environment is uncovered when by some means a dilemma is perceived. It is this perception which initiates the decision process, and its frame of reference is the individual's image of what exists (and his value components concerning what ought to be). The mechanism of arousal of such perceptions is unclear; however, it appears that essentially the feedback which one receives from his environment--the information relating to how he acts upon it--is compared to his image, and dysfunction is or isn't perceived. The criterion for such a step in decision making appears to be congruence between feedback information and the image. A state of complete isomorphism would result in no perception of dysfunction; deviations from this congruence would generate perception.

A similar process of perception exists in organizations (though there is no thought here of postulating some sort of organizational image or group mind beyond that of individuals). Gore has observed that because organizations are composed of a number of groups and clienteles, they are "subject to a continuous stream of demands....Because claims (now expressed as expectations) can never be fully satisfied, stress and tension inevitably result....Unrequited expectations serve the very useful purpose of describing what is needed and what should be done next."[69]

A number of means are available for determining what dysfunctions exist. Two of the most obvious are 1) the existence of an issue, and 2) the suggestion of a new policy as a solution. These two are perhaps the most common indicators that a problem exists, and what its major components are. For both the individual and the group decision maker, both of these means reflect concern about some particular aspect of one's environment. An issue or a new policy can be suggested (raised) both by individuals and groups, within and outside the decision making body.

The reason for making the point that new policy concerns delineate a problem or need is that Braybrooke and Lindblom[70] note that the raising of a policy concern or the suggestion that a particular policy be adopted does appear to be at odds with the perception of a dysfunction. It appears that one is generating alternatives before the problem is defined. This is not the case, however, for what planners must do in such a circumstance is look under the concern to ascertain the problem, so that they can evaluate what the suggestion means for them in their role. Decision makers, that is to say, do not respond to a policy suggestion blindly; they are concerned with what the problem is in the first place.

According to the notion that circles of decision making occur within each step of deciding, the decision maker must gather information and analyze the dysfunction in a back-and-forth process that may or may not be completely conscious. The end decision is a full description of the dysfunction and system. As this probing continues, one can see that each question asked requires a decision to be made.

To work with an example, on the surface it might appear that a dysfunction is unique to Negro residents of a particular part of the city; it may appear to be a dysfunction of income inequality that catches the mind's eye of a decision maker (perhaps through the aid of an uprising among his constituients). The dysfunction may be one relating to budgeting within the Negro family generally, or relating to individual wage earners. In pondering all the potential interpretations of the dysfunction and the system of which it is a part, one can see that there are degrees of certainty to be attached to potential alternative interpretations. Uncertainty, if it exists, must be resolved so that the proper system may be chosen, and the problem be determined--at least the one that decision makers are willing to recognize as their responsibility and tackle.

3) Conceptualization of the System of Interest. Having perceived a dysfunction, it is the task of the decision maker or planner to determine the exact nature of the system with which he is concerned. The purpose of such a conceptualization is to form a basis for a full determination of the scope of the need--the factual or value dilemma--which is perceived. The concept should include the type of system (for example, the system of gaining and expending monies in the household, or the system of producing refrigerators or public health services, or the system of allocating land to various land users). In addition, the concept of system should include the elements of the system (its components and stocks), its structure (channels of flow or linkages), the resources of the system (its inputs), and the functions of the system (its outputs). Finally, criteria for operation of the system ought to be included, for the purpose of the construct is to compare two (or more) states of the system using certain variables of its operation. The criterion for this step appears to be validity, both internal and external. The conceptualization ought to be consistent with research findings, and with the context which is being investigated. In essence this step serves to expand the decision maker's concept of image, so that he may more

sharply analyze the dysfunction he perceived and the feedback he is receiving.

4) Delineation of Contextual Values to be Served by any Action. Analysis of discrepancies between observed and expected states of any system cannot be done in a value-free environment. Some value concerning the focus and scope of analysis must be injected into the process, to contain what could be an unending process. Thus, in addition to the criteria for operation of the system under investigation, secondary values of the decision maker and planner not explicit in these criteria must be made explicit to guide the analysis. These values (among other possible values) include considerations of: appropriateness (the relevance of an idea or a need to the context, or of a solution to a problem); viability (the ability of an analysis or a solution to serve decision making needs through characteristics of intelligibility, fidelity, credibility, and convenience); impact (the type and scope of effects considered in analysis); effectiveness (the relative contribution--positive and negative--of factors in analysis and solution construction); efficiency (those considerations of marginal costs and benefits used to determine the effectiveness per unit cost of various types of impacts); technical feasibility (the likelihood that an action can be undertaken, given the state of the art or science of techniques needed); administrative feasibility (the likelihood that a given organization can perform a specified action by using its elements and structures in any manner); legality (the likelihood that required administrative actions can be undertaken without the imposition of sanctions from an internal or external source); political palatability

(the likelihood that chosen means and ends will not cause political conflict); distribution (the relative amount of impact which is received by various persons or groups); tractability (the ease of management of a particular action in a given administrative context); adaptability (the ease of adapting a particular action to changes in the context); coordination (the ease of coordinating actions with other actions taken by the same or different actors); future-year implications (the impact and distribution of actions over time); speed (the amount of time required to complete an action); and access and participation (the degree to which different groups have access to or participate in the creation of or operation of a given action).

It is obvious by the nature of these criteria that some might be considered more relevant than other criteria by different decision makers at different steps in the process. The reason for listing them is that the first analysis which is likely to be made public by planners is made at this point. The criteria serve as a checklist against which one can array the assumptions of analysis, to enable the decision maker to reconstruct his logic. In addition, these criteria carry through the process of decision making and planning. The criteria are continually referred to (though given varying weights) in later stages of the process, to ascertain the consistency of logic which underlies technical rationality. The criteria are also used in that sub-cycle of decision making which must be completed before one moves to the next step.

5) Assessing the Divergence Between Observed and Expected Systems. By comparing the performance (or the predicted performance) with the expected performance of an operating

system, divergences can be determined. The conceptualization of the system created in a previous step is used for assessing this divergence. In addition, predicted changes in the elements, resources, output, or structure of the system, under existing conditions or under likely future conditions (either goal-directed or random) should be incorporated into the comparison if information is available. Criteria based on contextual values are used to guide the analysis. Criteria for completing this step of decision making include validity and reliability--the ability to reproduce the assessment another time and obtain the same or similar results.

6) Identifying the Needs in the Setting. Comparing observed and expected conceptualizations of the system of interest to a decision maker, and identifying needs, are two different and distinct tasks. The former displays observation against theory or conceptualization; the latter points out what is important among the multitude of divergences. It is immediately apparent that where uncertainty is present in the analysis, it is exceedingly difficult to determine what divergences to look closely at (when what is important is unknown) or what is indeed important (when all the divergences cannot be uncovered). At times such as this, the decision maker is forced to satisfice, for he cannot maximize the return from his analysis of the problem. In either case--satisficing or maximizing--the decision maker must attempt to determine what is important, using as a cue his image and his set of contextual values to be served.

It is the criticality of observed divergence which must be determined. The image of the decision maker has inherent in it a set of expectations about the system in which he operates. If, for example, the system is the social system (loosely defined), the decision maker may have expectations about political power, order and security, freedom, peace and nonviolence, welfare (material prosperity), justice and equality, respect for human dignity, status and prestige, and development or progress. He may well see that the attainment of certain ends (call them instrumental objectives for the moment) will bring him a measure of attainment of his expectations. Among those instrumental objectives might be personal safety, health (physical and mental well-being), intellectual development and personal enrichment, economic satisfaction and satisfactory work opportunities, satisfactory leisure opportunities, ease of transportation-communication-location, and so on.

What the decision maker must do in any given situation is determine which of his expectations is most important at that time, and which of the observed divergences related to that expectation. The context is highly important, for in one situation freedom may be more important than political power, and in another situation the opposite might be true. This determination is important, yet it is abstract and must remain so. Like other steps in the decision making process, identification of needs must be reviewed as the analysis becomes more concrete, to determine if what seemed reasonable at a general level is still reasonable when concrete details enter the discussion.

7) Identifying Problems Generating Needs. Having indicated the relative (but tentative) importance of needs, the task of the planner is to identify system variables which act to produce components of those needs. The variables can be those which act to directly influence the need, or which indirectly influence the need. For example, if the need is a divergence between observed and expected access to educational

opportunities, the variable of transportation availability may more directly influence the need than would the variable of financial ability of the family to pay for all the costs of education. A need in housing is caused by the operation of certain forces in the housing market; the task of this step of analysis is to identify those forces, so that the decision makers may determine if actions can be taken which are addressed to relevant variables, which can influence those variables, and which have the potential of alleviating the needs to some (varying) degree. A necessity for this step of the analysis to be reconstructed in detail is a model of the system in which action will be taken; without a conception of how the housing market works, there is no way to tell what variables are influencing needs and to what degree they are responsible for problems.

8) Statement of the Objectives to be Attained in Relation to Problems, Needs, and Contextual Values. If a problem or a need exists the decision maker may or must decide to do something. What must be done is to set an objective, an end, or a goal, delineating what is to be sought in physical or behavioral terms.

The possibility exists, of course, that the decision maker may decide not to do anything about the problem. It is at this point in the decision making process that strategy comes into play--but the validity of that strategy must be determined relative to the decision maker's responsibility in each case. It is also the point that the value of change becomes an input. The decision maker may choose not to change; he may decide to create great change in the system; or he may propose a new set of values or a new interpretation of facts such that the dilemma no longer exists. The determination to be made is: how much change is possible, relevant, and generally desired within this context at this time? Braybrooke and Lindblom choose to focus their attention on a particular value of change: the value of incremental change, "...decision making through small or incremental moves on particular problems, rather than through a comprehensive reform program."[71] These authors continue, "the utopian goal, chosen for its attractiveness without thought for its feasibility, is not a heavy influence on this type of policy making."[72] Their reason for choosing this value in their strategy for decision is that it is one of the values in the political context essential to the survival of a democracy. They contend that non-incremental alternatives to action usually do not lie within the range of choices possible within the society, and thus ends must be adjusted to means. However, as Bolan contends, "there is a certain pragmatic attractiveness to this strategy.... (Yet) counter-evidence does exist to suggest that governments and institutions have made decisions which are not incremental, remedial, or serial."[73] Bolan, using the words of Melvin Webber, continues by pointing out that "the success of the British town planners in changing the rules of city building in England, and the success of the Puerto Rican planners in helping to transform an agrarian society to industrial status in less than a generation, suggest that even though planned parametric change may be uncommon, it is nonetheless possible."[74] It is because of this conflict of views about the value of change that it is important to ascertain--in any given circumstance--what are the appropriate or feasible values of change, even if done at a very general level.

The determination regarding change, and the determination of objectives, must be general, and itself be the subject of searching analysis. Although specificity is useful in analysis, it is important to be concerned with the cost of attaining objectives. Under such circumstances one can delineate only roughly what form the objective will take. If the problem exemplified as before is that Negroes are unable to obtain transportation priced within a particular range of their income, then an objective must be set which says, for example, "create a means whereby Negroes may obtain transportation at a cost no greater than X per cent of their income, or Y dollars per month." A subtle balance must be created between generality and specificity of objectives. Objectives ought to be expressed in quantifiable terms only if that quantity is a particular part of the problem.

It is seldom the case that the objective can be truly specific, including all bounds of the problem. Analysis of means available to solve the problem, and the costs of those means, have not been fully investigated by either the problem-posers or the problem-analyzers; this information cannot be part of their experience, and thus cannot be incorporated into statements of problems, needs, or objectives. It is this point that Braybrooke and Lindblom speak of when they say, "...an objective has very little meaning unless one can see just what some degree and kind of accomplishment of the objective looks like...to concretize these values this way tends to make the value indistinguishable from a particular policy."[75]

What is important for creative decision making and for the reconstruction of logic following decision making is to refrain from stating an objective such that only one policy or alternative action can attain it when there may exist several feasible actions which might attain it. Such a practice does not consider the benefits which might flow from the use of a small bit of additional information. To minimize the difficulties of analysis, however, the nature of the objective must be limited as sharply as possible. For example, if we say simply that the example objective is to find a means of transportation for Negroes, we are skipping a cost component of the problem. Such an objective is too general--like the generality of an objective such as opportunity and community for all men--omitting the fact that the Negro does have an economic constraint in this instance, yet not going so far as to limit solutions to bus transit.

What is needed is an objective which is a target, a goal, or an end; the objective must say exactly what is to be achieved, but must be free of overtones of a particular policy (except for policies set by contextual values). This type of output or behavioral objective allows for the full generation of alternatives for attaining the objective, as well as for complete analysis of impact for use in reconstruction of one's logic.

9) Design of Alternatives to Solve the Problem. When an objective has been set, the next step in the process of decision making is to create alternative actions which can attain those objectives, and by extension solve problems and meet needs. The task is one of generating logical systems of action (programs) which will achieve an outcome congruent with the objective set and achieve it to the satisfaction (or agreement) of all parties involved. (It is possible, of

course, to achieve other things than the objective set, both anticipated and unanticipated; these positive and negative consequences will be discussed shortly.) One of the major gaps in the literature on decision making exists in the design stage; there are few guidelines for how to proceed in generating alternative courses of action. Concern in the literature has been with problems of the certainty or uncertainty of outcomes, and the value to be attached to different types of outcomes. Few attempts appear to have been made to systematically explain how to design the means of attaining specified objectives. In Simon's stage of design, there is no explicit methodology; indeed, what may be most needed to advance the science of decision making is a gathering of various methodologies for creating or conceptualizing new courses of action.

A crude sort of methodology seems to exist, but it offers little help in reconstructing the logic of creation. One of the first steps is delineating the opportunity area that exists for a particular decision maker. Meyerson and Banfield use the analogy of an incomplete sentence handed to the decision maker, which may or may not have been phrased by one person, and may or may not have any logic to it. These authors point out that it is often up to the decision maker to "finish the sentence in a way that would seem to be rational."[76] The opportunity area (in a general sense) is that set of elements available for action and unbound by previous decisions, except in a way consistent with the objective and contextual values to be attained. The decision maker's task is to determine what courses of action are open to him. He must find out what means are available, within the responsibilities and obligations of his role, to allow him to influence the environment at some time in the future.

There is most certainly an interaction occurring here between feasibility (and other contextual values) and what is the range of things that is possible. The role and experience of the decision maker allow him to sort out what he may and what he may readily do. Thus, delineating the opportunity area is necessary to deciding and reconstructing logic.

Diesing suggests some of the concerns relevant to determining opportunity areas in confronting a problem. In a meaningful aside to his general discussion, he says

> In selecting possible changes, one chooses not the absolutely easiest (these would probably be indeterminate) but the easiest in the problem area. In selecting a problem area, one chooses not the absolutely most independent, as this would probably be indeterminate, but the most independent of those whose solution is possible with available resources. Since neither problem area nor easiest possible changes are given at the start, both must be determined together in a back-and-forth process which gradually narrows down the alternatives....[77]

Delineating opportunity areas and considering feasibility, however, ought not to get in the way of generating new and creative courses of action.

There are several conceptions of alternatives which may be generated. First, one may be given an intent (an objective) and asked to generate different tasks which would achieve what is intended. Second, on a slightly different level, one may be given a particular task and asked to determine alternative ways of performing the task. Which of these conceptions is used in the design of alternatives is simply a function of the manner in which an objective is stated. It is easy to see, though, that a continuous process of generating and choosing among alternatives may well exist in any complex system of actions. The complexity of this process, returned to when the topic of the adjustment of ends to means is discussed, illustrates the need for the emphasis given earlier on specific objectives to keep the analysis process from becoming of indeterminate length.

In the process of creating alternatives, the designer's personality may well be operating in certain phases of design. If an objective appears to be a difficult one to obtain, it is possible that an individual creating means for achieving the objective may have some utility consideration in the alternatives he creates--often unknowingly. Edwards has noted a study which suggests that the harder an objective is to attain, the higher will be its utility; in other words, as an end becomes more difficult to achieve, one's value for attaining it increases.[78] The person who "thrives on hardship" manifests this trait; as his work becomes more difficult, he values it more highly. The existence of such a relationship raises questions about the delineation of opportunity areas, and the impartiality of weighing alternative courses of action. It is possible, of course, that the world is so constructed that more valued objectives are _in fact_ harder to attain. On the other hand, if a goal becomes more attractive if it is harder to attain, caution in formulating models of decision making are required and analysis must proceed carefully. There may be many individuals who feel a deep inner conflict between working with an area which contains feasible solutions on the one hand, and valuing most highly those solutions which are least feasible or those ends most difficult to reach.

Let us assume that somehow alternatives have been designed which may aid in solving a problem. Three alternative solutions have been generated, all involving public anti-poverty programs. (To minimize complications here, the exact nature of the programs will be overlooked; rather, their characteristics of cost and outcomes will be featured, and the assumption will be made that each of the programs achieves the objective set--a determination actually made in the analysis phase of decision making.) The first alternative program attains the objective set, and adds to the total output of the national economy. (In this case, in economic terms alone, the public investment produces a marginal rate of return higher than would have been attained by a similar investment in the private sector, all other things being equal.) The second alternative attains the objective set, and is a program of direct transfer payments from high-to-low-income persons, resulting in a redistribution of income without adding to the total output of the national economy. The third alternative is a program which involves public investment where the rate of return is lower than might be attained by the private sector; in addition, the program does not involve the redistribution of income noted above. Given these three alternatives, then, each of which attains the objective but does it in a different fashion and with different "spillover" or external effects not considered in the determination of the initial objective for the program, the need is now to somehow choose among the three, or search for more alternatives. In order to choose, we must integrate both economic and non-economic considerations, or decide which is important for choice. A criterion must be selected and applied through analysis to each alternative, so that the most reasonable (rational) choice may be reached and the logic of reaching it reconstructed for public view.

10) Statement of the Criteria which the Chosen Actions must meet. In order to choose among

alternative courses of action, a criterion must be formulated to order the alternatives in terms of their meeting the specified objective. Not only must the criteria be designed, but they must be applied to each alternative. In this way the alternatives when analyzed can be ranked in order of their value in attaining the objective (a process to be discussed in the following section). It is important to decide upon and design criteria prior to analysis of alternatives, so that appropriate steps can be taken in the analysis to select just those data for investigation which apply to the criteria. The breadth or scope of each criterion influences the scope of analysis, and perforce admits only certain information to the process of decision making. Information on outcomes discovered by analysis may be deemed irrelevant to the values and responsibilities of the decision maker; it is for this reason that it is important to examine closely the criteria which analysts are using, if the process of analysis is conducted by others than the decision maker responsible for reconstruction of logic. There may be one, several, or many criteria which alternative courses of action must meet, in order to prove acceptable. The degree to which they are acceptable, over and above some minimal level (though there exists contention on this point), allows them to be ranked and choices made among them. Criteria are based on values--those personal values of the individual, those implicit in his role, or some aggregate of values from many individuals or roles. Needless to say, resolution of conflicting values must be accomplished before any (or many) criteria can be constructed and used in the decision process.

A. The Criterion Problem. Values as they are most often expressed are too general to be decisive in decision making, and only loosely related to constraints of scarcity in the decision making context. To say one ought to scrutinize his valued ends carefully is much too vague. Though a man may value such things as growth, freedom, approval, leisure, and security, and have preferences for those acts which provide such valued things, the values only prevent a decision maker from choosing an act which provides none of them--if he chooses to act consistently. If a man is choosing between the purchase of a boat and a high fidelity system, or between a job retraining program and a public housing project, it is obvious a tremendous gap exists between the direct (and even indirect) consequences of these acts, and the ultimate values listed. It is this gap between specificity and generality which must be bridged. In addition, a necessity exists of trading some amount of one valued end for another, given a scarcity of resources and means of attaining ends. A high fidelity system may offer more physical security than a car; it may offer more potential for intellectual growth than a car. Conversely, a car may offer more freedom of action, and may offer more approval by a wider range of people. Finally, neither act may contribute to financial growth, while both may contribute equally to enjoyable leisure. Similar differences may exist between job retraining programs and public housing programs, and the differences may be experienced by different people. The gap of differing "trade-offs" of valued qualities which different actions have must be bridged by the use of criteria, and analysis, and decision rules for choice.

In choosing, then, more than a list of values must be created. A means of testing and measuring preferredness among ends and means must be found. A criterion is that means. A criterion bridges the gap between values and the quality of acts by specifying the type and level of a particular quality one prefers. Criteria take the form "to the extent that quality 1 is increased in A units of measure x, objective I will be achieved." If the objective is profit, one criterion might take the form "to the extent that sales minus cost is increased in dollars, profit will be achieved." If the objective is a satisfactory home environment for slum dwellers, one criterion might take the form "to the extent slum dwellers' perceptions of the structure of their environment is increased in terms of their scores on the CU perception scale, a satisfactory home environment will be achieved."

This view of the nature of criteria is admittedly narrow, and purposely so. A criterion could state that maximum satisfaction be attained; the difficulty (often termed the "criterion problem") then becomes the measurement of satisfaction. Statements such as this, however, are difficult to employ in analysis, and consensus as to their suitability in a decision may be superficial and merely hide dissension as to how to determine if satisfaction has been attained. It is better, therefore--if possible--to sharply define criteria; such definition allows analysis of outcomes to proceed smoothly, and agreement by various decision makers on sharp criteria gives some measure of credibility to analysts' findings.

Criteria are sometimes constructed with such terms as maximize, minimize, or similar words employed. An objection to this practice must be raised if information is to be fully used in analysis. What is implied in the above terms is a seeking of some end; there is an implicit decision to act in a certain way. The appropriate point to introduce these terms is in the decision rule, for only there can determination of constraints of cost (economic and non-economic) be entered, and decisions about maximizing and minimizing be made. The exception to this statement is the case where a "requirement" exists about the quality of an act. For example, some minimal level might exist below which operations of an action might cease; a criterion would then include a statement of this level.

The "criterion problem" is often one of consensus as to what is an appropriate criterion, for this measure is actually a statement of what characteristics of an event will be assumed to imply or represent the end values sought. Needless to say, arguments about the criterion play a large role in the reconstruction of logic in decision making.

B. Utility. The manner in which values are manifested in criteria for choice has been termed the creation of a utility function. Utility is indicative of preference for different outcomes of actions. Hence, criteria can be considered operational definitions of one's utility, or his preferences for different states. Leaving criteria as just that--an operational statement of utility, let us turn to the notion of utility so as to see how one formulates his preferences for use in decision making.

A summary of the (changing) basic notions behind utility theory may be illuminating at this point.[79] What is of interest in this step of decision making is preference, made operational in criteria and decision rules. In many economic contexts, of course, profit and loss are suitable indices of preference, but in other contexts no such quantities are readily available. For example, indices are hard to define in determining one's preferences for a painting, a potential employee, or a specified social state. It might be possible, though, for a person to account for all his choices by assuming that he can form a simple ranking of things from the least liked to the most liked, such that he always chooses in any paired comparison the one with the higher ranking. Numbers can be assigned to his choices in such a way that their magnitudes reflect this preference patterning. One could assign 1 to the least liked, 2 to the next liked, and so on, with the largest number indicating the best liked. This can be done if one's preferences satisfy the one condition of transitivity: if A is preferred to B and B to C, then A is preferred to C. It must not be inferred, however, that any one choice has some particular number of "utiles" assigned to it, as if the utile were some latent index. If there were three examples of acts, A, B, and C, and if they were preferred as indicated above, the same manifest response pattern would appear in choice regardless of whether A had 3; B, 2; and C, 1 utiles (as an index); or A had 30; B, 2; and C, $\frac{1}{4}$ utiles. Ordinal preference patterns, or rank ordering of alternatives is necessary for working with utilities. In using numbers one must be especially careful, for indices of utility are only compared and the larger and smaller determined; indices may not be added or multiplied in ordinal form, for these properties apply to cardinal indices or numbers only.

One recent notion is the application of probability concepts to preferences, showing the uncertainty of values and preferences in certain situations. Based upon the observation that as persons move toward indifference between two objects, the notion says that persons tend to vacillate between the objects as to which is the more preferred. This notion, though not rigorously tested yet, might be termed "probabilistic preference."[80] It weakens the requirement of consistency and transitivity, but is both plausible (in behavioral terms) and potentially empirically testable. In Edward's terms, how well one likes stochastic models of choice depends "mostly on whether or not you like to think of choice as a probabilistic phenomenon."[81]

Individual utility, like determinations of probability, is a highly subjective and personal thing. The manner in which utilities are formed is constrained to an extent by a series of axioms, which basically require that a person act in some consistent manner, with a specified logic to his thought. Certainly this logic is a value; however, it is the same value which underlies the methods used to reconstruct logic, and so is of concern to us here. Utilities are determined afresh in each new situation, and encompass all the concerns of value--including contextual value--which a person has about a set of alternative actions and their outcomes.

Preference comes before the assignment of utility as an index; we do not want to slip into saying a man prefers A to B because A has the higher utility; rather, because A is preferred to B, A is assigned the higher utility. People then choose that alternative that attains some level of a function relating utility and subjective probability. The presentation of alternatives for choice may make manifest a utility function which the decision maker was unaware he had; a decision maker need not be conscious of his choices. The axioms of utility require only that choices of preference be transitive, that indifferent preferences be interchangeable, and that compound preferences be decomposable; it is quite possible that a decision maker can follow such guidelines without being aware of them.

Experimental findings, especially as reported by Edwards,[82] indicate that by and large man behaves in accord with these axioms, but now and then he does not. This simply admits that sometimes man is consistent. Since the main interest of this work is consistency, the supporting evidence for the thoughts behind these axioms must be viewed with a pleased (although a critical) eye; utility theory appears to be a workable way of viewing the translation of values into criteria for choice.

11) Analysis of Alternatives.

A. The Ordering of Valued Events. A part of the analysis of alternative actions includes an estimate of the likelihood (probability) that an outcome will occur, and a measure of the utility which those outcomes have, determined through application of criteria against findings of analysis. Three combinations of analysis results are possible: outcomes may be deemed equally probable, and their utilities may vary; utilities may be equal across outcomes, and the probability of outcome occurrence may vary; or both probabilities and utilities may differ.

For purposes of selecting an action, the first and the second results require only that outcomes be ranked in terms of their utilities or likelihood of occurrence, from most to least preferable or likely. When this is done, a decision can then be made based on some rule for selection among the alternatives (a point to be discussed in a following section). The assumption underlying this requirement, of course, is that a decision maker can rank all outcomes under consideration, or be indifferent among outcomes. This assumption may be met by one individual conducting the ranking, or by many individuals so constrained that their divergent preferences do not entangle the process of ranking. (Fairness to the many individuals who may be involved is the topic of the next section.)

Assuming, however, that an individual can rank outcomes, this ranking is not enough for the third type of result of analysis, where no level of equality can be found either of probabilities or utilities. In this last case, cardinal ranking must be undertaken, to indicate the strength of preferences (so that one can say A is 3.8 times as valued as B, for example). The method is necessary, for if two events 1 and 2 had outcomes of A and B with probabilities of occurrence of .4 and .8 respectively, the fact that one prefers A to B does not allow him to clearly complete the analysis, for cardinal numbers and ordinal numbers cannot be combined in multiplication--the operation necessary to complete the analysis. To find which act should be chosen, the (probability of A x the utility of A) and the (probability of B x the utility of B) must be compared. There is no way to know if (in symbols) P_a (U_a) is greater that P_b (U_b) unless U_a and U_b are in cardinal numbers (for example, 4 and 3, respectively).

Churchman and Ackoff[83] have presented a means of approximating the relative strengths of preference for a set of valued ends, by taking the judgment of a decision maker, using it to rank objects and assign relative strengths of preference to all objects compared to one another on a zero-to-one scale, then refining these judgments by comparisons of single objects with combinations of the others to check and improve the internal consistency of judgments. Their method requires, however, in addition to the aforementioned ranking assumption, the assumptions that 1) a decision maker can make "meaningful" assignments of objects to points on a scale, reflecting the strengths of his preferences; and 2) a ranking will be transitive, so that the value of a combination of objects is equal to the sum of their individual values. The satisfaction of such assumptions, however, appears to be the only way possible to arrive at a decision in "rational" terms when events cannot be arrayed so that their likelihood of occurrence or utility is equal.

B. Social Ranking of Valued Alternatives. The creation of some relation for ranking alternatives from the viewpoints of many different people involved in decision making has been given classical treatment by Arrow. Arrow, in his famous paradox, outlines several criteria which he feels a social welfare function (a utility function for some group) ought to meet. The criteria are basically criteria of fairness, such that no individual is slighted in the incorporation of his values among the values of others in the creation of a social welfare function.[84]

Arrow proceeds to show how, when these certain selected criteria are met, it is impossible to create a fair ordering of acts according to the preferences of different individuals (if those preferences are different). Arrow's paradox concerns aggregating individual desires to form some product which will describe a group. It assumes that each person is willing to be bound by the function, and that each person is equipowerful. The mechanism which most closely approximates this is the voting mechanism (among others which form social preferences from those of individuals, such as legal codes, dictatorships or rules of authority, the market mechanism, and so on). Arrow postulated several conditions which appear on their surface to be "fair," to create a function, then proceeded to show that the conditions could not be met by a fair voting mechanism. The postulates are as follows:

1) a welfare function must be defined for all possible profiles of individual orderings of preferences;

2) if society prefers x to y, and individual preferences between x and any other alternative are modified in favor of x (and no other paired comparisons are changed), the welfare function shall continue to assert that x is preferred to y;

3) if a profile of orderings is modified such that each individual's paired comparisons between the alternatives of the ordering are left invariant, then the social orderings resulting from the original and modified profiles of individual orderings should be identical;

4) for each pair of alternatives x and y, there is some profile of individual orderings such that society prefers x to y (that is, there is no case where x is preferred to y regardless of the preference orderings of the individuals);

5) there is no individual with the property that whenever he prefers x to y society does likewise, regardless of the preferences of other individuals.

Arrow's impossibility theorem states that conditions 1, 2, 3, 4, and 5 are inconsistent, in that no welfare function exists which meets them all. Stated alternatively, if a function meets conditions 1, 2, and 3, then it is imposed (condition 4) or dictatorial (condition 5).

There have been various attempts to circumvent Arrow's paradox. Many institutions are not concerned with a great degree of fairness; for example, Simon in an early work has pointed out that it is common to limit the range of discretion given any one decision maker by sharply prescribing his role.[85] In military units, for example, it is often true that commanders specify value and factual premises of decisions to be made by subordinates. Where discretion and individual difference is allowed, however, and fairness is a concern, Arrow's paradox is certainly relevant to the discussion of creating and reconstructing utility functions.

In practice there may be other ways of circumventing Arrow's paradox which are not so seemingly (or potentially) dictatorial as those suggested by Arrow himself. One way is to restrict the domain of the welfare function to considering one or two points on which dissension does not cluster. This method assumes there is some underlying structure to preferences which prohibits or limits extreme divergences of opinion. A second way is to lessen the demands on the welfare function by making (or finding) a number of indifferent individuals (or apathetic ones) who are willing to forego their equality rights (in the participation in ranking) to a minority whose members have strong preferences. A third way is to find some means of accommodating dissident members of the group, so that they will relent in their pursuit of conflict-causing values. Other ways than these may exist, but the use of any way out of Arrow's paradox must come to terms with the resolution of conflict among free individuals or the limitation of that freedom to expediently end the conflict.

C. The Use of Criteria in Analysis. Analysis of alternative courses of action is guided by the nature of the problem to be solved, and by the criteria which actions must meet if they are to be chosen for implementation. The method of cost-effectiveness analysis, or systems analysis, is essentially the same as that method of analysis outlined here. Quade has outlined five essential elements in systems analysis: the objective or objectives (analogous here to the problem to be solved); the alternatives; criteria; costs (here, an output of analysis); and a model (a systematic and simplified representation of the real world which abstracts the features of the situation relevant to the questions being studied).[86] Thus, it can be seen that analysis in decision making, as conceived here, is roughly the same as systems analysis in Quade's terms.

Analysis focuses on determining the probability that an action will attain its goal or solve a problem, and on the extent of attainment or solution. In certain cases, notably the ones where someone has suggested an action whose need was not seen by others, analysis must first uncover the likely outcomes of an action, then relate these to goals or problems which are deemed worthy of being bases for action. In any case, the outcome of an action must be assessed.

Given a set of criteria and alternatives to be analyzed, analysis determines the extent which these alternatives differ from one another, and from the status quo. In this mode of analysis, operations demanded by relevant methodology focus on the margin or increments by which one act or outcome differs from another, in terms specified by criteria. Braybrooke and Lindblom raise a rather superficial concern about this type of analysis, but its explanation may prove helpful. They state "instructed to compare alternative social states, an analyst may make an ambitious attempt somehow to comprehend alternative social states as abstractions to be compared with one another. He may completely miss the fact that only comparison of increments will do the job for him."[87] It is true that comprehension of all characteristics of alternatives may be unnecessary; however, some abstract representation of the relevant components of those alternatives is necessary, so that the analyst can determine where no difference exists, then focus on the relevant margins. Marginal differences can then be expressed in terms of criterion measures, and use to achieve preferred tradeoffs of differences.

The simplest form of analysis, of course, is that which is not concerned with anything but the degree to which an action will achieve its intended outcome, without even reference to cost. This extreme form of analysis, though simple, is rather unrealistic; in conditions of scarcity of resources, its only asset is speed.

Analysis determines positive and negative differences at the margin, which are then transformed to positive and negative benefits (or benefits and costs). These benefits and costs must also be computed for the status quo or no-action alternative, to determine the benefits and costs of change. A note here might be in order to differentiate (in one way) between various forms of marginal analysis all promenading under similar names. Classical marginal analysis, in that body of literature referred to as theory of the firm, represents the businessman as maximizing the difference between a discounted stream of revenue and a discounted stream of costs, both measured in dollars. Generally, the output (or action) is optimum when marginal revenue equals marginal cost. Cost-benefit analysis is analogous to classical marginal analysis, except it refers to public investment. Differences relate to use of opportunity costs (where these differ from market prices of resources) in addition to other costs, and all benefits which accrue at the margin, including those which do not lend themselves to efficient marketing. When benefits and costs are properly defined (again, in dollar terms), classical marginal analysis is used. Cost-effectiveness analysis is directed to those public investment decisions where the output cannot be evaluated in market prices, but the inputs can. Finally, as Niskanen has pointed out, classical operations analysis exists at the opposite end of the spectrum from classical marginal analysis. Classical operations analysis is conducted in physical or other non-monetary terms, where the problem is one of maximizing effectiveness subject to a specific set of resource constraints measured relative to the total amount of several types of resources available.[88]

Opportunity cost is often a relevant concern in public affairs. Opportunity cost, or the cost of foregoing other actions (such as investment), often is considered in analysis of the given alternatives, when one or the other of the actions must be taken, and the decision task is to choose among them. In another sense, however, the concept of opportunity costs reflects a value for flexibility or adaptability, or an ambivalence.

D. The Decision Rule. As a climax to the process of analysis, the decision maker needs some rule for choosing among alternatives which reflects his outlook on probabilities of occurrence and the mix of preferences which he values. This rule, the decision rule, is of the form: "In situation I (or in all situations), choose that alternative which achieves level I (maximizes, minimizes, is satisfactory, and so forth) in terms of criteria A (and/or B, C,...N) in relation to achieving level 2 in terms of criteria a (and/or b, c,...n)."

The decision rule performs the task of specifying trade-offs among preferences. It can take a number of forms, but in light of the scarcity of resources most generally expresses a relation between benefits and costs. It may also admit "intangibles" or those benefits and costs for which a suitable criterion or measure of the criterion cannot be found. McKean[89] outlines some of the common forms and shortcomings of decision rules (he calls them "criteria," a usage different from that here), and his work may be illuminating at this point.

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One form of decision rule is to maximize gain while minimizing cost. Since both these terms imply absolutes, it is (for all practical purposes) impossible to choose that act which simultaneously does both. A second form of rule specifies choosing that act which achieves the maximum ratio of benefit to cost; this rule, however, ignores the magnitude of benefit and cost. (Rules such as this one may be more useful when either costs or achievement level are fixed for some reason.) A third rule is to achieve some set level of performance without regard to cost, or conversely, to minimize cost without regard to benefits--a very unrealistic rule in contexts of scarcity unless the criteria of benefit and cost are chosen very critically. A fourth rule relates only A to B as measures of benefit to cost, without considering the impact on interrelated parts of the system--without considering indirect effects, "spillover" effects, or external economies and diseconomies. Misuse of such a rule may be a fault of analysis, or of the model of the system in which action must be taken. However, the mistake may also be in the choice of things deemed relevant to the analysis by some decision maker removed from the analysis. The import of this condition is that the responsibility of the decision maker extends to formulating the decision rule, regardless of who undertakes the analysis of alternative courses of action. The use or misuse of any of these rules must be justified, and consensus achieved among group decision makers, under the leadership of that person responsible for reconstructing choice.

As implied above, communication among responsible decision makers and planners plays an important role in the formulation of valid (legitimate) decision rules. When there are a number of participants in deciding, it is easy to neglect or misuse concepts of gain and costs.

There is often a tendency to discard or doubt the credibility of "intangible" benefits or costs when they are compared to "hard" data from analysis of criteria for which an accepted body of measurement methodology exists. Yet as Dorfman points out, many government actions deal with providing collective goods for which a charge to users is difficult or impossible to collect, and for which there is seldom a market value, and yet which often have valuable but complicated indirect impacts.[90] The heart of the matter of analysis lies in deciding what benefits should be considered, and whether the social value of benefits, though intangible, can be estimated reliably enough to justify their inclusion in the analysis.

Difficulty of measurement alone is no reason for excluding any data reflecting on a criterion, or disparaging its relevance to decision making.

"Wrong" concepts of gain or loss can be used in many ways--all of which must be examined for their usefulness by reponsible decision makers. It is possible to sub-optimize--to determine the benefits and costs relative to one level of decision making, without considering the relation of actions to higher-level objectives or decision makers. It is possible to neglect higher level gains or losses--to pick too narrow a measure of criterion attainment, neglecting other states of being which represent the same level of attainment (as in counting only ships sunk or students who drop out of school, when ships deterred or students who attend irregularly represent the same state of being, but are missed by a narrow criterion). It is possible to treat scarce inputs as though they were free, or, somewhat similarly, to take a biased view of benefits (as when a middle-class decision maker views an impact on lower-class persons in his terms, rather than in theirs). It is possible to include "sunk" costs, when the analysis should focus only on the cost of using existing resources and disregard the historical costs of their development. (This latter principle is based on the notion of marginal analysis.) It is possible to allocate joint costs in a variety of ways. Each of the "wrong" concepts of cost and gain is so labeled only for attracting attention, for wrongness or correctness is dependent on the situation, aims, and strategy of decision makers. Rational decision making, however, demands such concepts be explicitly identified and their use justified when decision makers and planners reconstruct their logic.

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Two decision rules appear more generally suitable to many decision tasks than others.[91] One is the rule which relates maximum benefits to costs; the other is that rule which directs one to maximize benefits or minimize costs when cost or gain levels (respectively) are fixed. In both these instances (as in the others above) it is important to remember that a multitude of levels of resource commitment and mixes of project components can achieve similar-appearing indices of preferredness, even using these rules.

E. Decision Making Under Uncertainty. Many of the considerations mentioned in preceding sections of this work have been studied under conditions of certainty, or risk. As has been intimated several times, there are few instances of decision contexts in which absolute certainty or uncertainty exists. Much of the time, an acceptable judgment of subjective probabilities of events is used in determining reasonable choices. It is more likely that outcomes of actions will be uncertain than that the entire decision making context will be uncertain. However, there are several concerns which decision makers have whenever uncertainty is present.

Uncertainty in decision theory refers to an unspecified degree of ignorance concerning certain facts or values. It is assumed that once facts are known (if they are a part of experience), some sort of preference can be formed if need be; thus, uncertainty only indirectly relates to values and will not be treated in this section. The task of the analyst is to place some outside limits on what the decision maker must treat as uncertain. When the analyst has bounded the area of uncertainty, what is left as uncertain must be treated in terms of a principle of choice which does not require probabilities as an input. Assuming that all certainty and risk has been specified which can be (through the use of effective search and other bases of information such as judgment and Bayesian formulae), what decision rules exist for uncertain contexts? Both Morris[92] and Luce and Raiffa[93] discuss the types of decision rules which can serve to deal with the uncertainty of outcomes concerning various alternatives, or uncertainty about future social states. There are presently five means of forming a decision rule: the principle of dominance; the Laplace principle or principle of insufficient reason; the maximin or minimax principle; the minimax regret (Savage) principle; and the Hurwicz principle.

The principle of dominance dictates that if of two alternatives one would always be preferred regardless of what future occurs, the other alternative may be discarded from analysis. This principle, used first in any analysis under uncertainty, may not yield a unique solution as best but will help to reduce the range of alternatives which must further be considered.

The Laplace principle or principle of insufficient reason is based on a simple logical assumption, and its very statement may raise certain feelings of doubt. Its essential logic is, since under uncertainty there is no evidence to the contrary, one might as well assume that all futures are equally likely. The principle has the secret of being simple, for it allows the selection of that alternative for which one's preferences are strongest without complicated mathematics entering the analysis. It has several major flaws, however, which bear consideration. First, its logic implies that the likelihood of all events being equally probable is the same as the likelihood that they are not; this is highly questionable in a system where many quantities are normally distributed. Second, the use of this rule is dependent on getting a collectively exhaustive and mutually exclusive set of possible futures. In the extreme case of this latter problem, values could range (for an outcome) from plus-infinity to minus-infinity; if one finds such values hard to accept, the rule gives little guidance for and is vulnerable to the use of a selection of ranges of likely values.

The maximin or minimax principles deal with maximizing one's minimum benefits or minimizing one's maximum costs. The use of these principles can be easily seen to be a highly conservative practice grounded in pessimism. The principles, of course, are most useful when conservatism is a reasonable strategy. There are extreme cases, though, where application of the principles is nonsensical (or at least makes one ill at ease with them). Such an uneasiness with the maximin rule would surely be felt where, in a case of two states (their probability of occurrence unknown) where one act would return $10.00 in either case, and a second act would return $0 in one case and $100 billion in the other. A decision maker employing the maximin rule would clearly choose the former act; yet the latter act has some pleasing and intriguing aspects to it. The rule does not cope with this phenomenon. A second problem, which is what might be called the reward phenomenon, or a lack of column linearity, is presented by this rule. Suppose, in the example above, if the first state were achieved the decision maker would receive an additional $100 regardless of which act he chose. It has been argued that this reward has no connection with which action is chosen, or has the same effect on both alternatives, and so should not influence one's choice. On the other hand, if that $100 is introduced into the decision, it changes the maximum minimum benefit in favor of the second alternative. These problems must be resolved if these principles are to be used in reconstructing logic. (The principles are useful, as Savage points out,[94] in two-person zero-sum games: an opponent who has respect for your intelligence will see to it--act so as to insure--that the most you can possibly take from him will be as little as possible.)

The minimax regret principle or the Savage principle is intended to counteract the conservatism of the minimax principle, and especially the problem of extreme reward versus consistent reward outlined in the preceding paragraph. In that example, act 1 in state 1 and 2 returned $10.00, while act 2 in state 1 returned $0 and returned $100 billion in state 2. Regret calculations assume that if one chooses the action that yields him the highest reward possible in a state, he has no regret; if he chooses some other alternative, he has regret equal to the difference in value between what he got and what he might have received as a result of the highest-valued choice. In the example, act 1 in state 1 would have $0 regret, while act 2 in state 1 would have $10.00 regret; similarly, act 1 in state 2 would have $99+ billion regret, while act 2 would have $0 regret. The minimax regret rule would choose act 2 as the preferred act, a less conservative but somehow intuitively more pleasing choice under uncertainty. The problems with this rule include the fact that it is not independent of the addition of "irrelevant" alternatives. The introduction of a new alternative action to a choice situation can change the preferred action from one to another, by changing the regret values. (Of course, there is also the difficulty that differences in utility, being computed here, may not measure regret.) In Luce's terms, what must be done is, if a problem is so formulated that the availability of certain acts influences the plausibility of certain states of nature, then the problem must be redefined to reformulate the states of nature and eliminate this interaction.[95]

The Hurwicz principle is intended to supply a rule for those situations where one's view is somewhere between extreme pessimism (in the minimax case) and extreme optimism (in the Savage case, or even more surely in a "maximax" case where maximum profit is maximized). It attempts to account for all levels between these two points. If we assumed a decision maker had some degree of optimism or attitude toward risk between 0 and I, a pessimistic person might have an index A near zero, while a relatively optimistic person might have an index A close to I. One of the Hurwicz principle demands a decision maker specify his degree of optimism, between or equal to zero or one, in any decision context. Then, in Morris' words,

> Having obtained a measure of optimism A...we then multiply the maximum profit for each alternative by A and the minimum profit...by (1-A). The sum of these products is called the "Hurwicz criterion," and the alternative which maximizes this criterion is selected.[96]

Under extreme conditions, when A=I, this rule is equivalent to the maximax rule above, while under extreme pessimism it is equivalent to the minimax rule. The problem, of course, is to determine the index of optimism or pessimism. Such an idea of an index is subject to the influence of outside forces--wives, the weather, war news in the morning paper. In addition, one could argue that because a person can suggest some index of his optimism, he could also formulate subjective probabilities and treat the task as one of decision making under risk. Also, the criterion has neither column linearity nor convexity--combinations of equivalent alternatives are not themselves equivalent.

Any of these rules can serve to cope with the task of choosing among alternatives with uncertain outcomes, but choice among them is only a matter of taste in the final analysis.

12) Action: The Ending and Beginning of Decision Making. Upon choice of the most appropriate decision rule and choice of a course of action, the decision maker must implement his choice. It is at this point that the planning process is linked to processes of programming, budgeting, and project design and management. It is the task of the planner to survey the operation of on-going projects as a part of the environment which he continually surveys, for the project is not separate from the system. The planner must evaluate the effectiveness of his projects, and take action to revise them or other components of the system as necessary in accord with the values of his clients and the facts of the situation. When such revising must be undertaken, it is on the basis of a perception of dysfunction that the entire decision making process is recycled.

DECISION PROCESS DYNAMICS

1) Individual and Group Resolution of the Appropriate Inputs to Decision Making. In decision making by individuals and by groups, interaction among inputs and decision makers occurs. Various degrees of consensus or commitment to inputs exist, and both internalized and external determinations of how to proceed with decision making often take place. At any time in the decision making process, a state may exist where one alternative input--a fact, some conception of the problem, a value, some notion of utility, or the relevance of acting as an incumbent in role X instead of role Y--where one input is clearly better than all others, and where this one input is clearly good

enough (satisfactory or optimal) to be acceptable. Under these circumstances, it is belaboring the point to show that a decision is made; rather, the decision is implicit in the decision maker's going onward to the next step in the process. However, there are times--the most visible perhaps when a decision maker is trying to determine what is relevant to defining or solving the problem--when conflict must be resolved before the process can proceed.

March and Simon have pointed out that conflict, such as this, arises in three separate ways: by unacceptability, by incomparability, and by uncertainty (all subjectively determined).[97] The same conflict resolution process holds for conflicts among inputs as for conflicts among alternative actions. Similarly, the same process holds for the resolution of individual and group conflicts over decision making. A close look at this process of resolution may allow the analyst to discriminate between the activities of governmental planning agencies and other decision making bodies.

An individual perceives conflict if, with respect to two or more alternatives, he is subjectively uncertain about the probabilities of their outcomes, finds their utilities uncomparable, or finds all alternatives unacceptable. In such a circumstance, it is assumed he is motivated to reduce the conflict--to search for means of overcoming it.

If uncertain, the individual will search for clarification of certain facts, and failing that will search for new alternatives. If unable to compare, the individual will tend to sequentially analyze and choose the first alternative which meets his needs (when pressed for time, he will satisfice). If alternatives are unacceptable, the individual will search for new alternatives, or, if the option is open to him, decide not to proceed. If new alternatives are sought and continually prove to be unacceptable, generally a new definition of "acceptable" results.

The rate at which decision makers search for ways to resolve these conflicts varies. This variation may, among other things, be caused by the press of time, the demands of simplification, or the availability of a "bland" alternative[98] as a way out of the conflict. (The notion of a "bland" alternative, one which has little likelihood of producing either positive or negative results, is quite like the use of an operational definition: it helps get the job moving, may be strategically valuable, but may not be "best" in some later analysis.) The import of this variation in rate, of course, will differ from situation to situation. In one instance, the greatest haste in solving a problem, or finding a premise, may be demanded, while in other instances some selective variation in the speed of resolving conflict may well be part of the decision maker's strategy.

The individual resolving such a conflict can easily serve as a model for one of the types of conflict over deciding which can plague an organization: intergroup conflict within the organization. In the following discussion of conflict resolution, both types will be treated as one. One component of conflict is a difference of view about the need for joint decision making. March and Simon observe that a high degree of interdependence of schedules of action, and great (mutual) dependence on limited resources tends to generate a strong "felt need" for joint decision making.[99] However--and this is an important disclaimer--such a felt need would most probably be generated only in organizations or groups where a strong commitment to unanimity existed; a decision would be made only when its terms were generally agreeable to all members of the group. A third influence on the felt need for joint decision making is the level of the organization represented in the decision making group (assuming, of course, the decision task is within their sphere of responsibility). Presumably, those roles higher in an organization would have in their defining norms the charge of direction of total activity or at least coordination of divergent efforts.

Uncertainty about facts and values in individual decision making has a parallel in intergroup or intragroup decision making. Participants may have either a difference in goals, a difference in perception(s) of the facts, or both. Differentiation of goals is often assumed away in studies of the economic behavior of the firm, along with the possibility of different interpretations of a goal common among a firm's participants. However, in reconstructing the logic behind organizational decisions, it is certainly important that conflict be resolved and the correct premise explicated.

Uncertainty and uncomparability are dealt with--resolved--by channeling the information through the learning cycle until some satisfactory level of certainty is attained, and comparability is achieved. If a premise is unacceptable, however, either because different views of the validity and relevance of facts or values are held, or because uncertainty or uncompatability cannot be resolved through learning, a mechanism is needed for aggregating premises. The components of such a mechanism have been suggested by Meyerson and Banfield;[100] what remains to be done is to insert the mechanism into the decision process.

If a number of participants (two or more) disagree on some point concerning decision premises, there are four general modes of conflict resolution available to them.* In accommodation, one participant chooses to make the premises of another his own, without concern for return on his surrender. If this mode of conflict resolution fails, participants may cooperate: participants set some end or principle as being decisive, then jointly seek a solution to the conflict in accord with that principle. Failing this solution to a problem, participants may contend: they may exercise their relative power to attain the inclusion of their decision premises over their adversary's premises. Depending on the initial and final distribution of power of the participants, contention may be viewed as bargaining (where participants seek only a relatively favorable position with respect to others) and struggle (where participants seek to dictate). In dictation, one participant compels the others to accept a settlement.

Concerns of unacceptability must be overcome in the decision making process to insure that a decision is reached at each step in the process. Demands for competing premises must be aggregated to make the most efficient use of information in planning; each alternative premise included in the process increases the amount of information which must be handled.

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*the nature and distribution of power is not a central concern of this report. Generally, the concepts of power, influence, authority, and force are poorly integrated across studies, and there is little agreement as to the exact nature of each. For an overview of issues, see Press, C., Main Street Politics: Policy Making at the Local Level, East Lansing: M.S.U. Press, 1962; and Polsby, N.W. Community Power and Political Theory. New Haven, Conn.: Yale University Press, 1963.

Participants in public decision making may be considered to be of four types: involved, concerned, interested, and non-involved. An involved participant is one whose state of being--in any of his roles--is directly affected by the decision making process or its content. (For example, an involved participant is one whose role definition directs him to bear responsibility for taking part in making a decision, or a person who will be affected by having to build a highway after a highway construction decision is made.) A concerned participant is one whose state of being is indirectly affected by the planned actions of public decision makers. (For example, a concerned participant is one whose family is moved to make way for a highway being constructed.) Concerned participants vary, of course, in the degree of their being affected by a public action--the degree of impact perceived is directly related to the utility of entities being affected. An interested participant is one who perceives his self-interest is being affected by the making of a public planning decision, but it is ascertained his interests are being affected less by the decision than by the sum total of other decisions being made or implemented at the same time. (For example, an interested participant is one who is concerned about the effect of an action on the market value of his house, but finds the action does not create the negative effects the owner invites through failing to maintain his own property.) A non-involved participant is one who has no interest in the making of a particular public planning decision.

A participant of the first three types may be either active or apathetic. The apathetic participant may manifest this condition for a number of reasons--lack of knowledge that the decision is being made, lack of ability to communicate his interests or work with other participants, lack of a perception of the degree to which his interests will be affected, or lack of belief in the existing method of making decisions, among other reasons. It is the planner's responsibility to include in the making of a decision all those participants who are involved in, concerned with, or interested in that decision, in accord with contextual values and in the interests of providing the best quality of planning information. Exactly who is a legitimate participant may be determined systematically only after a concept of public responsibility has been formulated. However, it may be pointed out that all, or any combination of, the identified types of decision makers may be legitimately involved in a planning process, depending on the values guiding behavior in a particular public context.

Among the participants who might be involved in the making of a particular policy decision include members from all conceivable groups. It is the task of the planner committed to creating a rational decision to be responsible for ascertaining the values of the publics he serves toward the participation and degree of consideration various persons ought to have in the process of public decision making. Basing his judgments on findings concerning these values, and some theory of public responsibility, the planner will be able to proceed to construct a logic which will appear reasonable to his clients.

2) Types and Levels of Decisions.* A decision making process has an ending and beginning for heuristic purposes only; in actuality, decision making is a continuing process involving continually evolving data. In any decision about an action there are a number of levels of decisions proceeding and following a particular choice point. There are policy-level decisions, setting guidelines to which following decisions must adhere; programming decisions, setting the general actions which will be implemented in accord with policies; and project management decisions, setting the operation and allocation of resources to various parts of project components of a program. No such clarification scheme is intended to be exhaustive or optimal; the only purpose of displaying one here is to force the realization that consistency often must be achieved across many levels of decisions, and generality or abstractness of premises can grow as the level of decision making is raised above project operation.

Types of decisions vary according to the step in the decision making process in which one is located. One must make a decision about premises to be admitted to the following step: he must ascertain a dysfunction cue or delineate the contextual values he must serve before proceeding to the following step. Thus, one type of decision is to set premises for a following decision. A second type of decision is to change premises--for example, based on feedback from the environment one might decide that his conception of an operating system was untrue, and change his earlier premise, thereby re-tracing the intervening steps he took in decision making. A change may involve substitution, re-ordering, or re-weighting premises. Finally, if one is unable to construct a satisfactory premise, he may terminate the process at that step. Often, the termination is a drawn-out process, taking on the characteristics of a stall; indeed, here can be seen the close link between method and strategy in decision making. The reason for outlining the possible revisions in formulating decision premises is simple: it serves as a cue to the feedback process and adjustment of ends to means and vice versa, allowing the decision maker to more completely reconstruct his logic.

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*I am indebted to Jack Ott, an associate in The Ohio State University's Evaluation Center, for providing the ground for development of these concepts.

3) Search. Much of the literature concerned with describing normative models for decision making contains the requirement that "all possible" alternative actions be considered, or that the "full range" of alternatives to solving a problem be generated. In making such statements about the scope of investigation, writers often limit the use of phrases "all possible" and "full range" to analysis concerning alternatives, but there is no logical reason for this; indeed, it implies that other investigations in decision making--problem definition, objective determination, and the like--should also be comprehensive in scope and depth. Several criticisms of this position have been made, one on the grounds of human capacity for handling such information, and the other on the grounds of likelihood of action resulting from such comprehensiveness. March and Simon[101] have advanced the hypothesis that most human decision making, whether individual or organizational, is concerned with the discovery and selection of satisfactory alternatives;

only in exceptional cases is it concerned with the discovery and selection of optimal alternatives. (An optimal alternative can be considered one which is demonstrably the best of all possible alternatives.) Yet to discover the alternative which is optimal it is necessary to search all possible alternatives. The generation of all possible alternatives, they argue, is a formidable task, which can be accomplished only in extremely simple decision tasks where all factors are known and their interrelations certain. A coin flip has only two outcomes; a complete set of outcomes from the use of two factors of production can be known given a certain level of technology. Most decision contexts, however, are less certainly described and more complex: there are many ways to wear clothes and design a city or educate a child. The authors argue that, in these decision contexts, given certain objectives, a decision maker seldom has the wits to generate all alternative courses of action. He must seek a satisfactory description of the problem, generate a satisfactory set of alternative actions, and choose a satisfactory course of action to take.

Braybrooke and Lindblom[102] argue against the "full range" norm in decision making on the grounds of what might be called political reality. They posit that the results of actions are resisted if they are too reactionary or far-reaching and disturbing of the system's equilibrium. The easiest changes to make are incremental--non-incremental change occurs less frequently, there is less experience to deal with it, and policy analysis is less able to come to terms with it. These authors then argue that if the analyst wishes to be effective and efficient, he ought to concern himself with only increments of difference from the status quo, generating incremental policies, assessing incremental differences, and suggesting only incremental changes.

A third argument is related by Morris,[103] who reminds the analyst that time is money (grossly simplifying his terms). Using Bayesian concepts, Morris suggests that search for additional information be considered in terms of 1) the probability of finding information (implicitly, data which supports a notion one did not suspect was so); and 2) the relevance or utility of that information. In economic terms, he suggests the decision maker continue search until the marginal cost of discovering an additional alternative (or any other bit of information to be used as an input) is greater than the marginal gain to be derived from using it. The trouble, of course, with this approach is the methodological difficulty of determining cost and gain.

Search is a potentially viable and valuable alternative to judgmental decision making in conditions of uncertainty, if techniques are available for assessing its probable costs and potential benefit, even crudely. However, if no means are available for analyzing how helpful search might be, or how low its cost (initially) will be, the decision maker must make a judgment about the value of search.

4) Feedback and the Adjustment of Ends to Means. There are instances where a decision to be made cannot be made, where (for example) a satisfactory alternative cannot be found, or the measurement of a criterion cannot be completed because of a lack of data and inability to obtain it. Much of the literature on decision theory, however, is normative, and directs the decision maker to determine ends, then to generate and choose among alternative means of reaching toward those ends.

Such a normative guide, as Braybrooke and Lindblom have pointed out, is useful only part of the time, for what the decision maker establishes as objectives are derived from inspection of means (in large part). Feedback, the passage of information concerning the operation of one step in a process to a person concerned with an earlier step, is used to notify those responsible for early steps that their guidance was unsatisfactory. If a step cannot be completed, it is altogether appropriate to return to an earlier step (and redefine terms) to achieve a fluidity of the decision process which invites, as settled rules do not, explorative and creative responses to problems.

SUMMARY

The conceptualization described above has a linear structure of steps to be taken, with decisions made at each step about the nature of the analysis. The process has feedback loops built into it, with search and conflict resolution activities available to the analyst when he encounters uncertainty. The model demands, as a norm, as much certainty, scope, and depth to the facts and values admitted as can be determined will be beneficial. Criteria in the conceptualization demand optimization where possible, and satisficing where necessary. Above all, the model demands that values and technical processes be made explicit.

The perception of a dysfunction, based upon one's (personal or institutional) image of present, present expectations, future expectations, and the line of movement from present to future, begins the planning process. The discrepancy between observed and expected, if unsatisfactory in perceptual terms, requires the planner to articulate problems by conceptualizing the system of interest (both what is and what is not). The planner then delineates contextual values to be served in the system, to begin to narrow the field of discrepancies to those which can and should be scrutinized more closely. (These values serve as a base for further narrowing throughout the analysis.) Contextual values are then used to review divergencies in the system and identify needs in the setting--critical divergencies which must be overcome. Problems generating these needs are then viewed: possible causes or controlling parameters are identified, and most likely causes (which contribute most to the problem) revealed or chosen. Through a search for a set of possible (reduced, elaborated, and articulated) expectations satisfactory in terms of desired payoffs, problems are translated into their opposites--a statement of objectives which can be attained. Design of alternative actions to meet the objective is then undertaken, by stating and elaborating courses of action (at any of many levels of specificity) and their likely outcomes. In light of the nature of anticipated outcomes, earlier-identified contextual values, and the objectives to be attained, criteria are defined which chosen actions must meet. Considerations of one's aspiration level at this point gives one raw material for building a utility function or payoff function, and the form of that function--simple or complex--guides continuing design and analysis of alternatives in the search for a satisfactory or optimal solution. Analysis of the alternatives is undertaken with each or all available options: outcomes are investigated, their payoffs defined, some ranking undertaken, and the planner finally determines if any alternative measures up to the standard set in the utility function. According to the environment for choice and previous consideration in the analysis, a decision rule is formulated to choose the "best" alternative in terms of the certainty of its action, and the value of its cost and payoff. Finally, action is taken to implement the chosen alternative--or it may be planned further, programmed, or budgeted in a process identical to the one above. It is the writer's belief that the conceptualization just put in synopsis form will be heuristically useful in applying pieces of theory and different models to the planning situation. To test this belief, the following section will be devoted to a retrospective analysis of various schools of thought about planning method and strategy.

CHAPTER FIVE: ANALYSIS OF THE CONCEPTUAL FRAMEWORK

AN ANALYSIS OF THE CONCEPTUAL FRAMEWORK IN THIS REPORT

Viewing both the context and inputs of urban planning, and the extant models and theoretical constructs available to the planner in decision theory, what appears to be the most appropriate conceptual framework for reconstructing the logic of planning? What appears most reasonable is that there is _no one_ model or conceptual framework which is most appropriate. Rather, the choice of model ought to be related to the situation at hand.

An overview of a conceptual framework based on this study would show the viewer a composite model with pieces drawn from many sources. The model would be linear; it would contain the steps of decision making discussed in the previous chapter: perception of a dysfunction, conceptualization of the system of interest, delineation of contextual values to be served, assessing divergence between observed and expected states, identifying needs and problems generating needs, stating objectives to be served, designing alternative ways of attaining objectives, stating criteria and analyzing alternatives, and choosing the most reasonable course of action. In addition, such a composite model would admit a cycle of decision making at each step, coupled with feedback of premises and the possible adjustment of ends to means when premises or actions are not feasible. The composite model would accommodate certainty of facts and values, but would most likely work in environments where the satisfactory rather than the optimal could be calculated. Maximizing would be possible, but satisficing would be the rule. Thus, the composite model would allow for search motivated by aspiration and moderated by the costs and benefits (again, either satisfactory or optimal) of information gained.

Participants would enter and leave the process, their decision premises (after differences were resolved) accepted because they aided in completing the decisions and plans to be made--the premises increased the ability of planners to determine reasonableness, and to design reasonable actions.

1) A Look at Altschuler's Work. The conceptual framework suggested here may be used by the planner in reconstructing his logic, but must be used only after he ascertains the terms of reasonableness particular to the "public interest" of the context in which he is working. In technical terms, the conceptual framework is value-neutral. For example, in Altschuler's discussion of a land use plan for St. Paul,[105] he outlines many steps which planners undertook to make a reasonable plan. However, to criticize these steps on technical grounds one needs some sort of guide for viewing the planning process. Using the conceptual framework, it is possible to determine that St. Paul planners technically were rational in omitting the consideration of social problems from a process which they conceived as directed toward reserving for each parcel of land that use which was most desirable. One could criticize St. Paul planners for stating that the purpose of the general planning process was goal determination and yet providing no means of ascertaining (beyond introspection) what goals were held by groups in the city. By going through such a process of determining the actions which planners took, the participants they encouraged, and the information they admitted to decision making, judgments about the degree of technical rationality may be formed.

2) A Look at Schools of Planning Thought. The use of a conceptual framework allows one to react to various position statements concerning how planning ought to be done. As can be seen from the discussion of this

report, variations in the scope of responsibility of planners may make a "disjointed" method of analysis appropriate or not, and affect the planner's statement of the problem, the objectives set, the criteria for use in analysis, and other components of the planning process.

Similarly, the planner's values concerning future of orientation (in certain situations where little theory exists) may force him to admit a great number of uncertain facts and values--an input which he will find difficult to cope with given the present state of decision theory. Another choice, the planner's concern about change, can result in a (perhaps unknowing) choice of operation in a particular school of planning thought, as the following will illustrate.

A. Adaptive Planning. "Adaptive planning" has been proposed by John Friedmann as a valid mode of operation in specific situations.[106] Adaptive planning is an attempt to relieve temporary crises caused by changes exogenous to the system trying to overcome those crises. (Planners would also attempt to utilize exogenous opportunities, such as Federal aid.) As contrasted with "developmental planning," which attempts to undertake new action supported by unused resource capability, adaptive planning is a do-nothing notion about planning which demands change only in crisis. It must be justified in terms of inputs representing facts certain at least to the level of risk, and crisis-belief widely held in the population (probably based on widely-shared knowledge of relatively certain facts--the danger and likelihood of a flood, or an urban riot, for example). When this mode of planning is not used with probability values, it can be seen to have a weak base. Once employed, however, there is nothing inherent in it which demands satisficing--indeed, optimal solutions are likely to be obtained given the degree of certainty to the facts used. Nor is there anything which demands only incremental change. It is a mode of planning which can be justified, however, only when one is highly conservative to begin with, and desires to react only to certain, exogenous, forces.

B. Ad Hoc Opportunism in Planning. A method similar to that above, and explicated by Bolan, responds to endogenous crises and opportunities. A planner operating under this method is given (or assumes given) certain predetermined rules of the game, and within them seizes opportunities to move toward some highly generalized goal as circumstances permit. In essence, however, this method must be justified on one of two grounds, both unfirm: either the planner subjectively chooses to do whatever he wished (or whatever his clients wish), or some larger plan-justification from which must come his givens must be the base of his plan. This method may best be viewed as completely subjective planning.

C. Advocacy Planning. The notion of planners as advocates for the interests of groups within (or sometimes outside) the political arena is a response to the tension of the demands for objective professional practice and the social conscience of the planner as an individual. Davidoff[108] suggests that special interest groups have their own plans and planners, but in so doing the planner is giving up concerns for the public interest (at least visibly) for a contracted concern for special interests. Such a viewpoint as that of the advocate planner would heavily prescribe values to be admitted to planning, and perhaps make analysis much more feasible than is true given the "public interest" as a base for objectives and criteria. However, such a planning process can only be used instead of an overarching process for planning, for use of both would likely be no different than the present babble of vested interests swirling over and among subjectively certain or risky facts.

D. Intelligence-Systems Planning. Webber has recently expressed hope for a programming strategy based on intelligence centers--mechanisms for providing better information about the current states of affairs in various urban sub-systems.[109] Basically a research strategy, the proposals upon which Webber bases his hope are extensions of the learning model discussed in Chapter 3. They are proposals for monitoring stocks and flows in the urban systems of relevance to planners and public officials, but this monitoring needs guidance to be valuable--the characteristics to be monitored depend upon theoretical formulations of how the system is and what it is expected to be. For those groups of persons or planners who could use such a system, it might be valuable, albeit an expensive resource. However, any group could use the system. Because only the certainty of facts and not the structure and content of values is changed in this method, there seems to be little change in the likelihood a "more reasonable" decision would be made in terms agreeable to all participants. Anyone can--and it appears ought to--use the learning strategy implicit here, if they are uncertain of fact.

E. Other Views of Planning. It is possible to see that incremental planning has a particular value of change inherent in it which makes it useful for certain situations. Middle-range programming, on the other hand, appears an attempt to cope with as much predictive certainty concerning facts and values as is possible given the state of the art of forecasting and simulation of social systems. Comprehensive planning of the sort described by Chapin can be seen to be a form of planning with many critical assumptions: one is capable of identifying significant trends, principal and pressing problems, benefit estimates, and the scope of comprehensiveness appropriate to a given setting. Comprehensive planning, then, appears to be a form of planning adapted to systems which exhibit certainty of information. Innovative planning may be seen to be a form of planning for uncertain facts--the use of small scale tryout projects is uniquely designed for providing experience with new solutions. Adaptive planning is beginning to emerge as a reaction of man to a perceived hostile environment. In a similar fashion, it appears, a new type of planning could be analyzed to determine the context and inputs with which it is most usable, and that type of planning then could serve as a model for reconstructing logic in settings where it was appropriate. In the final analysis, whatever method is chosen is only as effective as the planner who can effectively participate in the political arena where social choices are made. Reconstructed logic is only a tool for political participation.

3) A Note on Bolan's Synthesis in "Emerging Views of Planning". Richard Bolan has done considerable work in integrating a number of recent probes into the nature of the planning process.[110] He has identified variables which might be used to depict the character of the public agenda, the general (public) decision system, and planning system components, and further identified how these variables and their outcomes might be interrelated. However, Bolan deals with strategy in the main, while this report deals with method. Bolan only casually mentions variables which affect definition of the logic underlying planning; indeed, in a recent

discussion[111] he expanded his conception of the total planning environment at the expense of assuming that the planning method employed will produce an appropriate plan--and it is this assumption with which this report deals.

SUMMARY

The features of the conceptual framework created appear to be usable in analyzing the makeup and some of the assumptions of schools of planning thought. This retrospective analysis, while having limited value in and of itself, indicates that a forward-looking analysis might also be fruitful. It appears possible that the framework and thoughts on strategies of planning (or the strategic variables in political participation of planners) might be integrated to create new methods and strategies of planning for different contexts and sets of inputs.

CHAPTER SIX: SUMMARY, CONCLUSIONS, AND IMPLICATIONS

SUMMARY OF THE REPORT

In response to a need for reconstructed logic to buttress the foundations of planning, decision models and extant theory have been surveyed. Any decision model for planning must satisfy several criteria, as well as working in the context and inputs of planning (given individual and institutional differences among planners, as well as the certainty or lack of certainty about relevant facts and values). Existing models of decision making appear to fall short of meeting the need above; the models individually are not applicable to all situations which planners encounter. Thus, a conceptualization (model) of planning was developed to allow the planner to relate his inputs and contexts to an integrated structure which might be helpful to him in identifying relevant bits of decision theory for reconstructing logic. It appears the model created may be heuristically useful in analyzing schools of planning thought, and might have potential for generating new methods and strategies for planning.

CONCLUSIONS

A new conceptualization, synthesizing existing decision theory and models and generalized from data contained therein, appeared needed to overcome shortcomings of existing models. When analyzed in terms of the criteria for an appropriate conceptualization, the model suggested appears to have some utility, though it is far from complete. All that is systematically synthesized here are considerations of decision theory for a reconstruction of planning logic. However, the considerations are both normative and descriptive in nature; they include satisficing and maximizing behavior for a range of purposes of planning, in accord with the values which decision makers hold or grant to planners. The considerations provide a link to other forms of decision making; it is a value-neutral model, except in the technical sense. No particular political ideology is incorporated into these considerations; rationality and objectivity are incorporated into them. Information cost is a key component of these notions, as is a process of continually deciding. Final conclusions about the model must be based on its utility in actual planning practice.

SHORTCOMINGS OF THE STUDY AND FURTHER NEEDED WORK

A serious shortcoming of the model presented is its ambiguity. This is manifested most visibly in two points--in attempting to measure reasonableness, and in attempting to determine appropriate search behavior. An additional shortcoming is the complexity of the model--it is far from a step-by-step guide to choosing appropriate measures for reconstructing planning logic. The model obviously does not quite meet the criteria set for a conceptualization of the planning process. There are three steps which might be taken in further research, and possibly more. First, the model might be expanded into a series of single steps consisting of operations on information--gathering, organizing, analyzing, and reporting that information. Such a model would certainly be less ambiguous, but more complex. Second, a taxonomy of decision models for commonly-encountered situations might be generated, again making the model more usable. Third, the model might be tried out in an agency setting to determine what parts are most usable, so that the model might be modified.

IMPLICATIONS

What of the productivity of the model? What can be done with the considerations listed here? The model appears to have three potential contributions which it can make. First, the model can provide a framework for viewing problems in planning. If planning is not accepted by its clients, or the organization of planning does not appear to be appropriate, the model may suggest new ways of justifying planning (in a meaningful fashion), or new ways of providing service to the planner's clients. For example, the planner may define anew the limits of possible planning, so that the client may know what is currently possible within the state of the art. Or the planner may redefine the notion of rationality so that it is mutually acceptable to both client and planner. Finally, the planner may redefine methods of planning to fit the situation in which he finds himself--he may seek more certain information about the ends sought, if that appears to have the highest benefit for his clients, or he may seek further information about means to shared ends, or ends which may be matched with means at hand.

Second, the framework may provide suggestions for generating a strategy of planning which an agency may use to adapt to different situations. An agency may have an information seeking process which is flexible and gathers information usable in ration and in more rudimentary (although contextually appropriate) forms of decision making.

Finally, the framework may provide a basis for a theory of planning as a form of public choice behavior. It can provide the general structure upon which a theory of design can be mounted, and a concept of theorizing be attached, so that the planner may know not only how to analyze in specific situations, but may create innovative courses of action based on sound theory verified afresh.

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